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With Which Is Combined

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Builds Big News Print Mill At Bucksport, Me.

Maine Seaboard Paper Co. Will Soon Place in Operation Its Fine New Plant With An Initial Capacity of 300 Tons of News Print Daily—Designed by George F. Hardy and Constructed by the Morton C. Tuttle Co., It Is A Model of Efficiency In Every Respect

By A. A. Tanyane of the Paper Trade Journal

AS IF by the hand of magic there has come into existence a giant industry, standing out amidst splendors of nature's scenery, a pulp and paper mill which is the result of the vision of individuals confident of the future of the pulp and paper industries, as well as in the industrial development of the State of Maine. As physical facts of what these individuals have accomplished within less than one year's time, the plants of the Maine Seaboard Paper Company, at Bucksport, Maine, are an inspiration for other industrial leaders interested in the future of Maine as a manufacturing state. The successful carrying out of this purpose will be accomplished largely through the great Hydro Electric Power development at Bingham, Maine, where 100,000 hp. of electrical energy will be generated by three units, one of which will directly supply the paper mill with power over a transmission line sixty miles long across country.

Ground Broken Last November

In November, 1929, after plans had been developed and it was definitely determined to build a news print mill, the first ground was broken and today, less than one year later, there stands as a monument to the men confident as to the future of the pulp and paper industries, as well as that of their own state, a pulp and paper mill nearly completed and ready to make its first run of paper. This result has been accomplished in such short time, principally through the wholehearted cooperation of every one of a thousand or more individuals, who have been engaged in the work, and have watched the rapid strides toward completion made daily by the new baby of Maine industry. A more ideal location, both for its surrounding scenic beauty and transportation facilities, could not possibly have been selected within the state. Situated on an elbow in the Penobscot River, in the Town of Bucksport, the site affords a commanding view of the surrounding country for many miles. Located at tidewater, shipments can be made by boat during all seasons of the year with the added advantage of rail shipments as well. Railroad sidings extend into the yard of the mill for incoming and outgoing freight and an extensive wharf running the entire side of the mill has been constructed for the shipment of paper and for handling sulphur, lime and other commodities brought in by boat.

Designed by George F. Hardy

The mill, designed by George F. Hardy, of New York, and erected by the Morton C. Tuttle Company, of Boston, Mass., represents the last word in pulp and paper mill construction. Built on a solid rock foundation of brick, steel and concrete, it presents an impressive picture of the substantial character of its construction.

It is the fourth news print mill built in the United States since the Taft Administration passed the reciprocity measure with Canada, through which news print was put on the free list and represents an investment of over $10,000,000.00 in plants and timberlands. In addition to the land, partly occupied by its various plant buildings, the company owns outright large tracts of timberlands in Maine which insures a supply of pulpwood for many years, a supply which will not be tapped until necessity compels. For several months there has been arriving almost daily by trains and steamers, shipments of pulpwood from Maine and other sources and there is already stored a large supply ready for the first turning on of power. The handling of this pulpwood has been greatly facilitated through the use of an electric drag rake which is a newly invented type of equipment for handling of pulpwood, and manufactured by the Maine Electric Company, of Portland, Maine. It is a fascinating picture to observe the rapidity with which this electric drag takes hundreds of pieces of wood at a time, stacks them in any height or length of pile desired, or delivers them to the pulp mill conveyor. It is estimated over 100,000 cords of wood will be consumed annually to supply the present needs.

Water Supply from Silver Lake

The direct water supply is from Silver Lake, located one mile away from the Penobscot River. There is also a pumping station at Alamoosuc Lake, water from which is pumped over an elevation of land into Silver Lake. Between Silver Lake and the mill is located the Filter Plant, having a capacity of 15,000,000 gallons daily and equipped with two North Filters made by the Green Bay Foundry and Machine Company.

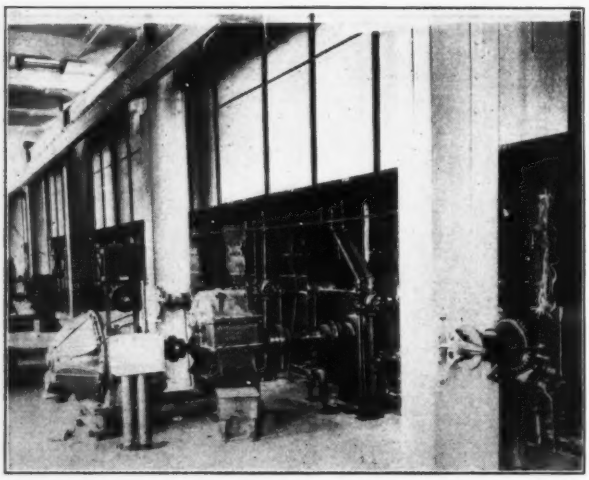
Capacity 300 Tons Daily

The paper mill is designed initially for two machines of estimated capacity of 300 tons of news print per day, and can be readily enlarged as the demand for its product requires. The first machines installed are two 228-inch Fourdriniers, built by Rice, Barton & Fales, Inc., of Worcester, Mass., of the latest type, having many exclusive features, equipped with 48 dryers each, and Beloit removable and adjustable wires. They are built to run at a speed of 1500 feet per minute. Both machines are fitted with the Ross-Brinier drying systems and the Ross ventilating systems are installed throughout the mill. Each machine is equipped with

3 3A Bird rotary screens, copper lined head boxes, Van De Carr inlets, Beloit suction rolls, Nash pumps for suction pumps and boxes driven by General Electric motors, and Westinghouse direct motor drives are applied to each machine. The breast rolls and paper rolls are made of spun cast metal and third press rolls are dispensed with entirely. All polished metal parts of the machines are chromium plated and all gears are encased, which will tend to minimize all possibility of accidents. Each machine is equipped with a series of Stimmel winches for handling the weight on the drier stretches, acting as counter weights and balance control. Every foot of the machine room, finishing room and roll grinding room is built on solid rock and all machinery is set in concrete foundations. All interior walls are finished in "Mill White" and all the structural steel and piping are aluminum painted, thus enabling daylight effects in every corner of the plant.

Electrically Equipped Throughout

The entire mill is electrically equipped, using direct connected drives and Tex rope transmission, the electric energy of 110,000



VIEW OF THE STIMMEL WINCH.

volts being transmitted over a steel tower line from Bingham, 60 miles away. This voltage will be reduced at the mill by General Electric transformers to 6600, 2200 and 440 volts. Between 18,000 and 20,000 hp. will be required for present operations.

Much care has been given to the selection of equipment for this plant in order to select the most modern and proven machinery for a high speed news print paper mill. The boiler house is

ELECTRIC PULPWOOD DRAG.

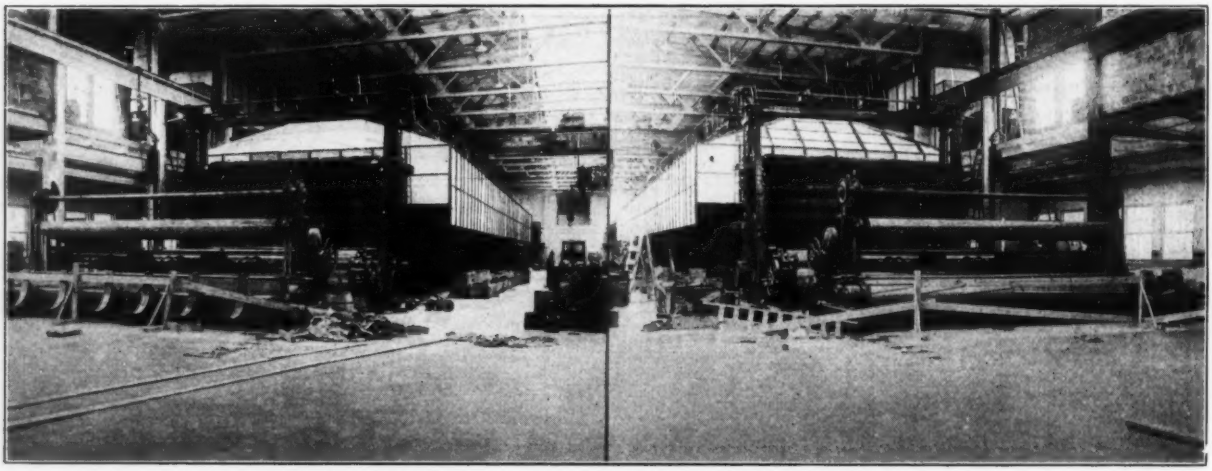
equipped with three Babcock & Wilcox Sterling Type 608 hp. boilers of 425-pound pressure each, with Bailey water walls. Oil as the fuel is fed to the boilers from two oil tanks of 55,000 barrels capacity each.

The entire scheme of the layout of the mill is such that every step in the process of manufacture is on a continuous straight line operation from the wood room to the landing of the finished product on the shipping platform.

In the mixing room where the fine screening, thickening and filtering of sulphite and ground wood stock and white water takes place, are installed seven Trimbey ground wood screens, four Trimbey sulphite screens, two Feinc filters on sulphite and eight Feinc filters on ground wood, the latter taking the place of deckers.

The wood preparing room is equipped with American Barking Drums made by the Fibre Making Processes, Inc.; chippers and chip screens, chip crushers, hand barkers and wood splitters made by the Waterville Iron Works; and wood and chip conveyors supplied by the Stephens-Adamson Manufacturing Company.

The ground wood mill, having a capacity of 500,000 lbs. daily, is equipped with ten Waterous Hydraulic Magazine Grinders in five lines of two grinders each, each line being driven by a 3500 hp. synchronous motor made by the Electric Machinery Manufacturing Company. This department is also equipped with Waterous Coarse Screens. All other motors in the ground wood mill were furnished by the Allis-Chalmers Manufacturing Company.



VIEW IN MACHINE ROOM OF MAINE SEABOARD PAPER CO., BUCKSPORT, ME.

The Sulphite Mill

In the sulphite mill having a capacity of 150,000 lbs. daily of unbleached sulphite, are installed three digesters, each 15 feet in diameter by 50 high, face to face of nozzles, these built by the Portland Company, which also furnished all the bronze fittings for the sulphite plant. The acid plant for producing the sulphite cooking liquor, has been fitted with the Jenssen lime rock towers and acid systems. The acid resisting systems and acid tanks were furnished by the Stebbins Engineering Company, as also the digester linings and blow pits. The blow pit bottoms were designed and installed by the Nortman-Duffke Company.

Modernly Equipped Machine Shop

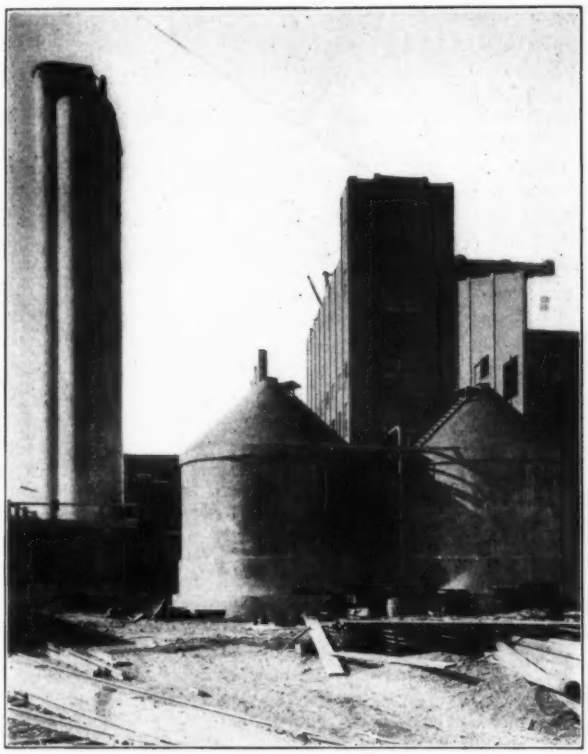
An essential factor in the completion of any modern pulp or paper mill today is to have a modernly equipped machine plant to handle promptly repair jobs, the making of new machinery parts, etc., in order that the continuity of production may be carried on with the least interruption. Therefore, there has been provided in connection with this new plant a modern machine shop, fully equipped with lathes, drill presses, bolt cutters, shaping machines, threading machines and other equipment which could be considered a part of a well rounded machine shop. Two large, well filled stock rooms are supplied with surplus parts which can be provided for any emergency which may arise.

The foregoing gives but a brief description of the plant and equipment of this new plant. The mill is rapidly nearing completion and indications are that the first run of paper will be made before December first, and judging by the speed with which the work is being carried on, it is a certainty that the expectations will be fulfilled.

Wharf and Storehouse

To take care of its water shipments of news print the company is building a new wharf on which will be located a storehouse of 3,000 tons capacity. In keeping with the modern trend of industry, there has been started the construction of forty modern homes, steam heated, fitted with electricity, electric ranges, electric refrigerators, etc. Each home is surrounded with a plot of land 60 x 100 feet.

The following are the officers of the company, the men responsible for starting this enterprise and who have been active in carrying out its completion:

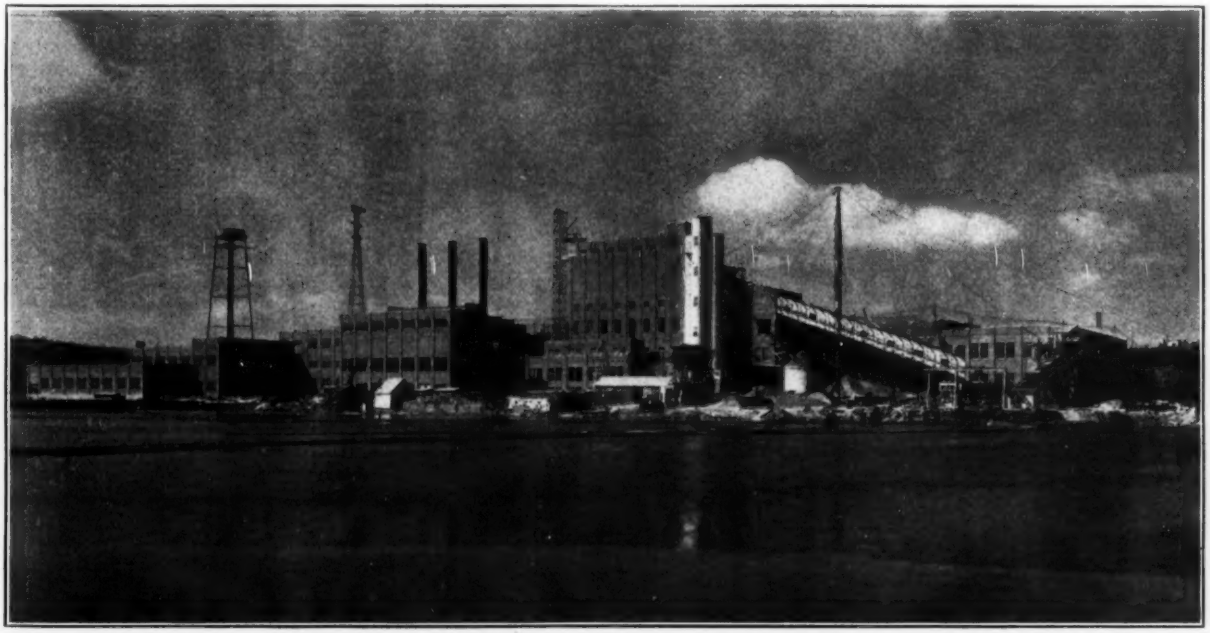


JENSSEN ACID TOWER SYSTEMS.

Officers of the Company

President, Walter S. Wyman, also president of the New England Public Service Company and President of the Central Maine Power Company.

Vice-President and general manager, F. C. Bagley, also vice-



GENERAL VIEW OF THE PLANT OF THE MAINE SEABOARD PAPER CO., BUCKSPORT, ME.

president and general manager of the Cushnoc Paper Corporation, Augusta, Me.

Treasurer, George O. Spencer, also treasurer of the New England Public Service Company.

Secretary, Leonard A. Pierce, of Cook, Hutchinson & Pierce, of Portland, Me.

Directors consist of the officers and the following: Harold S. Smith, of the Wright Company, Inc. of New York; Carroll S. Perkins, attorney of Waterville, Me.; William B. Skelton, attorney of Lewiston, Me.

Mill Superintendent, Frank P. Silver.

Equipment

The following is a list of some of the equipment installed for operation in the Maine Seaboard Paper Company plants.

Pulpwood Stacker	Berlin Construction Co.
Pulpwood Electric Drag	Maine Electric Co.
Pulpwood Conveyors	Stephens-Adamson Co.
Cable Conveyors	M. Garland Company
Wood Room Conveyors	Stephens-Adamson Co.
3 U-Bar Barking Drums, 2 Knotters & Washers	Fibre Making Processes, Inc.
Wood Chippers, Chip Screens, Hand Barkers and Wood Splitters	Waterville Iron Works
3 Digesters, 15 ft. diameter, 50 ft. face to face of nozzles	Portland Company
Blow Pits and Digester Linings	Stebbins Engineering Co.
Blow Pit Bottoms	Nortmann-Duffke Co.
Lime Towers and Acid Systems	G. D. Jenssen Co.
Bronze Valves and Fittings	The Portland Co.
10 Watrous Grinders	Watrous Engine Works, Ltd.
6 Norton Pulp Stones	The Norton Co.
4 Empire Pulp Stones	The Smallwood Company
3 Bull Screens	Watrous Engine Wks., Ltd.
7 Ground Wood Screens	Trimbey Machine Co.
4 Sulphite Screens	Trimbey Machine Co.
10 Feinc Filterers	Filtration Engineers, Inc.
Trimbey Metric Mixing Systems	Trimby Machine Co.
2 228" Fourdrinier Machines	Rice, Barton & Fales, Inc.
6 3A Bird Screens	Bird Machine Co.
Renewable and Adjustable Fourdrinier Wires	Beloit Iron Works
Ross-Briner Drying System	J. O. Ross Engineering Corp.
Suction Rolls	Beloit Iron Works
Paper Machine Drives	Westinghouse Electric & Mfg. Co.
Stimmel Winches for dryer stretches and balance control.	Stimmel Winch Co.
Calender Stacks	Farrel-Birmingham, Inc.
Finishing Machines	Williams & Wilson, Ltd.
Automatic Scales	Toledo Scale Co.
All general purpose motors	Allis-Chalmers Mfg. Co.
Paper Roll Conveyors	Standard Conveyor Co.
Chain Hoists & Travelling Cranes	Reading Chain & Block Co.
10—3500 H.P. Motors for Watrous Grinders	Electric Machinery Mfg. Co.
2 North Filters for Filtering Plant	Green Bay Foundry & Machine Co.
2 Ground Wood Storage Tank, (100 tons each)	Chicago Bridge & Iron Works
2 Forced Induced Oil Tanks (55,000 bbls. each)	Chicago Bridge & Iron Works
1 Sprinkler Tank (150,000 gals.)	Chicago Bridge & Iron Works
Feed Water & Pressure Regulators	Mason Regulator Co.
Steam Purifying Systems	The Farnsworth Co.
Temperature Recorders, Controllers for Paper Machines, Recording Pressure Gauges and Portable Tachometer	The Foxboro Company
13 Stock Pumps, 18 Single Stage Double Suction Pumps	Warren Steam Pump Co., Inc.
3 Three Stage Pumps	
4 (2 Duplex Sets) Vacuum Pumps	
2 Flat Box Pumps	
2 No. 4 Vacuum Pumps	Nash Engineering Co.
2 Dryer Exhaust Units	E. D. Jones & Sons Co.
Breaker Beater	
Transformers & Controller Room Equipment	General Electric Co.
Electric Motor Controllers	Cutler-Hammer Co.
3 B. & W. Sterling Type 608 H.P. Boilers, 425 lb. pressure each, Oil Burners & Water Walls	Babcock Wilcox Co.
4 Terry Steam Turbines	Terry Steam Turbine Co.
4 Ingersoll Rand Air Compressors	Ingersoll Rand Co.
Steel Gate Valves Smaller Steel Valves, Cast Iron Flange Fittings, Fabricated Piping	Walworth Co., The Crane Co., Jones & Loughlin Steel Co., Reading Iron Pipe Co.

Ross Installs Equipment in Glatfelter Mill

The new book paper machine at the mill of P. H. Glatfelter Company, Spring Grove, Pa., has been equipped with Ross hoods and exhaust ducts. These hoods and exhaust ducts are of the patented panel type and constructed of Transite asbestos instead of sheet metal.

Rising Paper Mill Completely Overhauled

Many changes have been made during the past year at the plant of the Rising Paper Company, Housatonic, Berkshire County, Mass. The mill has had a very complete overhauling and is now reported to be as up-to-date as any plant manufacturing similar grades of paper in the country. The major improvements are as follows:

New filter plant complete with automatic chemical feed.
Five new boilers.
New smoke stack eliminating power driven induced and forced draft fans.
New thrashers and rag handling equipment.
Electrification of washers.
New bars and bed plates in all beaters.
New motor driven jordans with consistency regulators.
Tolhurst installations on both machines.
Installation of Waterbury Drives for variable speed control on paper machines.
Additional driers on both machines.
New Barber Loft complete.
New coal handling equipment.
New drainer bottoms.
New motor driven stuff pumps.
New shipping room with electric conveyor from box shop for cases.
New store room and steel shelving for ream stock.
Complete new chemical laboratory with centralized manufacturing offices.
New water wheels and connected generators.
Installation of unloading conveyor for raw materials.

Modern buildings have been completed as follows:

New building for size making.
Three story addition to machine room.
New building for oil supplies.
New centralized stores department.
New display room for sales conference.
New dwelling for manager.
General alterations to Rising Inn.

New Gatineau Boiler Plant Starts Operating

The new boiler house at the Gatineau news print paper mill of the Canadian International Paper Company began operation on October 1, when electric energy now being delivered by the Gatineau Power Company was released for delivery to the Hydro-Electric Power Commission of Ontario under its contracts with the Gatineau Power Company.

The plant cost $1,000,000 and houses four Kidwell boilers, with an aggregate capacity of 5,200 boiler h.p. An additional boiler will be built in the near future. Plans for the boiler house were prepared by the engineering forces of the company, in conjunction with the mill staff, and the boilers were manufactured by Canadian Vickers, Ltd.

Last March marked the third anniversary of the starting of Gatineau mill, an all-electric paper mill. On March 31, 1927, the sulphite mill began production, followed by the ground wood mill five days later. The first machine began making paper for shipment April 14 and the last of the four installed in the mill was producing news print by August 19 of that year.

Improvements at Car de Van Paper Mill

The Car de Van Paper Company, Inc., paper manufacturers, of Stockport, N. Y., have just completed the construction of a new dam of concrete at the mill. The dam is 182 feet wide and 14 feet 6 inches high. The company is also installing a new hydro-electric wheel for which the Rodney Hunt Machine Company has the contract. A number of new installations are also being made in the beater and machine room. Is expected to turn the big machine over shortly. When the power plant is completed the power developed will be 240 hp. The company is also installing a Diesel electric generating set for reserve power.

Most Modern Kraft Mill Starts at Mobile

Big New Plant of International Paper Co., Has Two 210 Inch Fourdrinier Machines, Designed to Operate At 1,000 Feet Per Minute—Also Equipped With 172 Inch Yankee Machine, Designed to Operate At 600 Feet Per Minute

ONE of the most modern and best designed kraft paper mills in the world is the plant of the International Paper Company of Alabama, recently placed in operation at Mobile, Ala. It is the fifth southern kraft paper mill of the company and its daily capacity of 220 tons raised the company's total capacity to 800 tons of southern kraft paper and board per day, in addition to the capacity of the kraft paper mills of its Continental Paper and Bag Corporation in northern United States. Incidentally, when the Panama City mill—which is nearing completion—goes into operation, the company's total capacity will reach 1,000 tons of southern kraft and board per day. Mobile mill and the four other southern kraft paper mills have been grouped into a subsidiary known as Southern Kraft Corporation.

Located about four miles north of the historic city of Mobile, in an area known as Magazine Point, the site of the Mobile mill covers about ninety-six acres and is on the Alabama State Docks Railroad which connects with all ocean-going steamship lines as well as with all railroads entering Mobile.

The water supply for the mill is furnished by eight deep wells. The wells are located on the mill property and are from 350 to 500 feet deep. These wells have a total rated capacity of 6,000 gallons per minute. Layne multi-stage motor driven pumps are used for the pumping installation. All of the electrical energy for power and all steam for process work is purchased from the South Eastern Production Company. The power company delivers both the electricity and steam to the mill buildings.

A good idea of the size of the construction may be had from the following statistics. Approximately 2,000 carloads of building material, machinery, and supplies were delivered by rail to the site. One carload of steel sash putty was used for the windows and over 4,000,000 common and face brick were used for the mill buildings. Seventeen carloads of special brick work cement and 3,600 yards of sand were required for brick work.

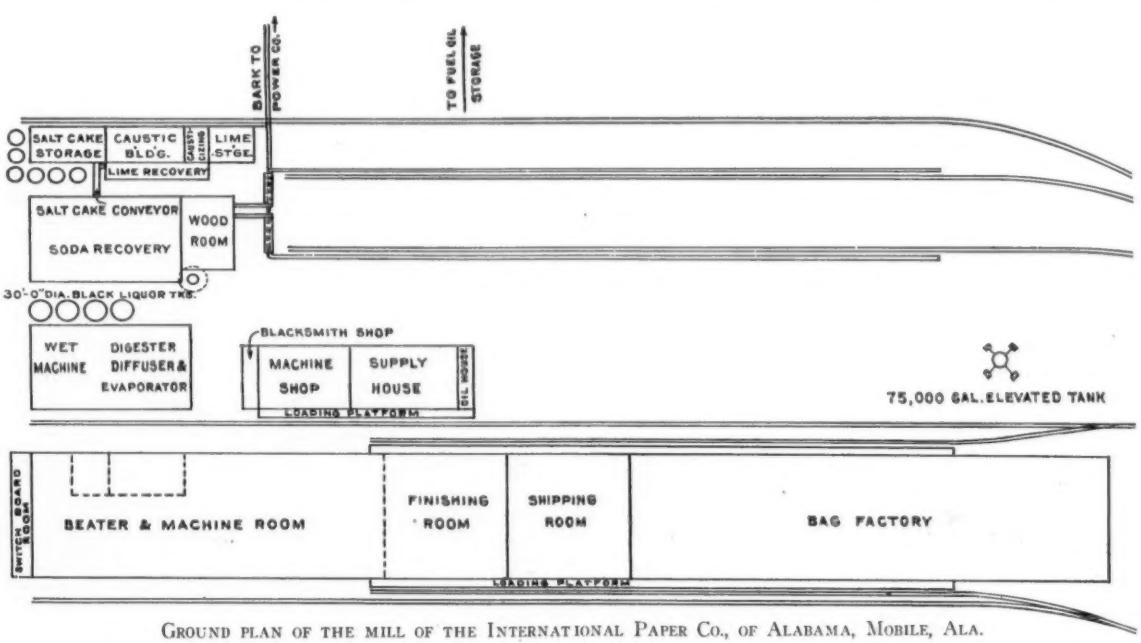
Mill Group Consists of Eight Buildings

In the group comprising the Mobile mill there are eight buildings, as follows: Wood room; soda recovery building; caustic building; building housing digesters, diffusers, and evaporators; main building housing beater and machine rooms, finishing room, shipping room, and bag factory; machine shop and supply house; laboratory and first aid; and the office.

The wood room building is sixty-nine feet wide by eighty-eight feet six inches long and is of reinforced concrete, brick, and steel construction. It consists of one story and basement, most of the basement being above ground level.

The soda recovery building, immediately adjoining one of the long sides of the wood room, is 199 feet by 106 feet. It is also of reinforced concrete, brick and steel construction, and is two stories in height. The caustic building located near the recovery building, of reinforced concrete, brick and steel construction, is 294 feet long and fifty feet wide. The causticizing department section is three stories high while the balance of the building is one story.

The pulp mill building, housing digesters, diffusers, evaporators, etc., is of reinforced concrete, brick and steel construction with a gypsum roof deck and a built-up waterproof roof.



GROUND PLAN OF THE MILL OF THE INTERNATIONAL PAPER CO., OF ALABAMA, MOBILE, ALA.

PANORAMIC VIEW OF THE KRAFT PULP AND PAPER MILL OF THE INTERNATIONAL PAPER CO., OF ALABAMA.

The building is 219 feet long, 100 feet wide, and ninety-eight feet high over digesters and diffusers. The digester and diffuser room section is three stories high, while the wet room is two stories.

The paper mill section or the main building housing the beater room, machine room, finishing and shipping rooms, and bag factory, like the other buildings mentioned, is of reinforced concrete, brick and steel construction with a gypsum monolithic rail embedded roof deck covered with a built-up composition roof. This building is 1,427 feet, ten inches long and 157 feet wide. The beater and machine room section comprises one story and basement, while the bag factory is two stories in height. A switchboard room for incoming electric power is located on the end of the beater room farthest from the machine room.

The machine shop and supply house, a one-story building, has been constructed of reinforced concrete, brick and steel construction, as were all of the buildings housing process equipment. It also has a gypsum roof deck covered with a built-up roof. The building is 300 feet long and fifty feet wide.

The laboratory and first aid building is of one story brick construction with composition shingle roof and is located convenient to all buildings to assist in plant control and test work. The office is located near the main entrance to the plant and is architecturally old English.

Process Equipment of the Mill

The process equipment of Mobile mill includes.
Two—American barking drums.
Two—88-inch Carthage chippers.
Two—Rythe and Pringle chip screens.
Two—36-inch Lombard chip crushers.
Eight—Blaw-Knox digesters
Twenty—Diffusers
One—Swenson quadruple effect evaporator
Eight—Manitowoc disc evaporators
Eight—Manitowoc rotary incinerators
Eight—Smelters
Eight—Dissolving tanks
One—causticizing tank
Four—presettling tanks
Ten—settling tanks
Three—Mount filters
One—Vulcan lime kiln
Four—Packer flat screens
Three—Bird pulp screens
Five—Oliver thickeners
Five—Allis-Chalmers rod mills
Eight—Dilts Beaters
Three—Dilts continuous "broke" beaters
Ten—Shartle jordans—No. 6 special
Three—Shartle jordans—No. 2 Miami
Two—Beloit foundriniers—210" wires
One—Beloit Yankee—172" wires.

Wood Storage

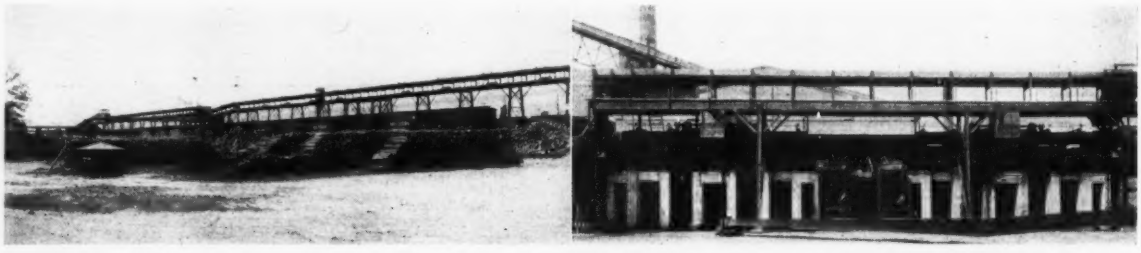
Provision has been made at the plant for storing approximately 5,000 cords of wood. About fifty per cent of the wood is delivered to the mill on barges and is conveyed to a storage from the barges with a chain conveyor. The rest of the wood is brought in by rail and auto truck.

This storage permits a sufficient quantity of wood on hand at all times to meet any emergency, and not enough to prevent the wood from being used every two or three months. Pine begins to deteriorate after two or three months in storage. Therefore, it has been deemed advisable to store the wood in only such quantities as can be easily utilized within definite time limits.

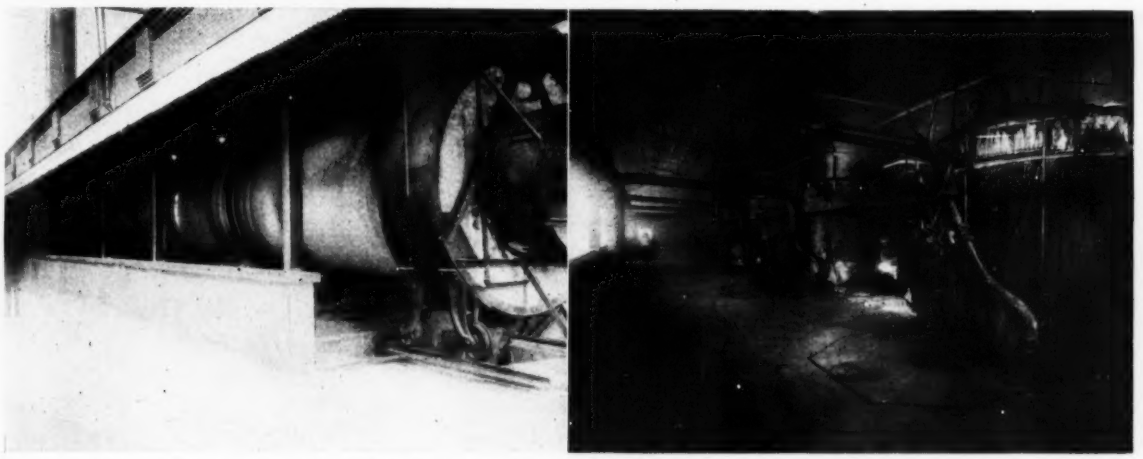
Portable conveyors permit easy handling of the wood from storage to the permanent wood yard conveyor installations which carry it to two American barking drums.

Wood Room Operations

The American barking drums are located in the wood yard outside the wood room. They are installed facing each other



LEFT: UNLOADING SOUTHERN PINE AT MOBILE MILL. RIGHT: THE BARKING DRUMS AT MOBILE MILL.



LEFT: THE LIME KILN AT MOBILE. RIGHT: INTERIOR OF THE SODA RECOVERY BUILDING AT MOBILE.

so that they both discharge into two adjoining and parallel conveyors. The wood, entering from the ends farthest apart, works its way through the drums and discharges into its respective conveyor which conveys and distributes it to one of two 88-inch Carthage chippers. The bark refuse is conveyed away from the barkers and is used as fuel by the Alabama Power Company.

The chippers are located on the main floor of the wood room which are supported on individual and separate foundations which extend through to the basement level. Each chipper is individually driven through a motor and belt drive, the motor installed on the basement floor and the corresponding belt extending upward through an opening in the floor to the chipper pulley. Such an installation reduces floor vibration to a minimum.

The chips produced by the chippers are elevated to two new type Ryther and Pringle chip screens which are also located on the wood room floor. Again vibration has been reduced to a minimum by setting the screens on a foundation that extends upward to the wood room floor from the basement floor level.

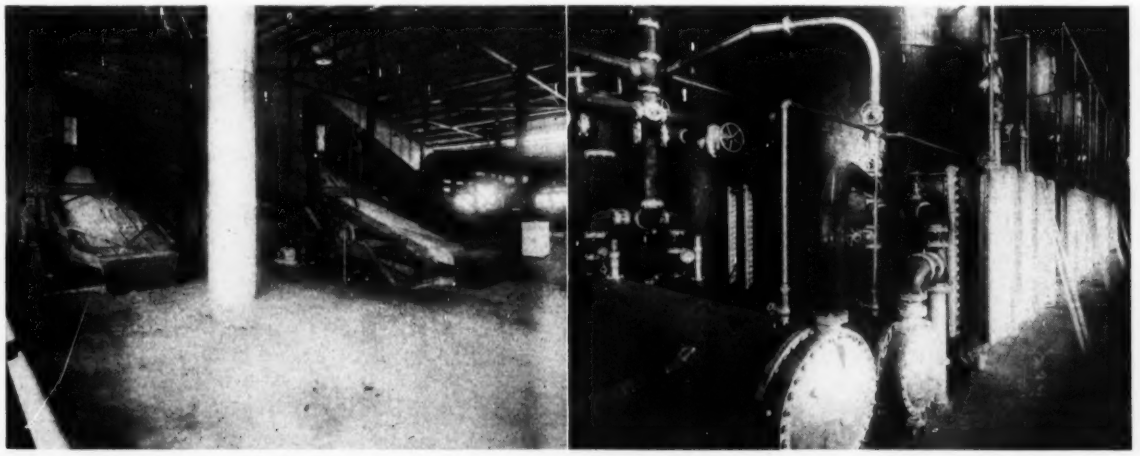
The only equipment on the main floor of the wood room that is supported by the floor is such conveyor equipment as is necessary for handling the wood and chips, a Rogers type 843 knife grinder, and the motors for driving the chip screens.

In the basement of the wood room and located above the floor level are installed two 36-inch heavy type Lombard chip crushers. One crusher is installed for each screen and receives by gravity the oversize rejects of its corresponding screen which are reduced in size by passing through the machine.

Continuing as two separate systems, the screened chips from the chip screens and the crushed chips from the crushers together enter Sturtevant fans, which by air blast convey them to the chip above the digesters. Each of the two Sturtevant fans is directly connected to a 200 synchronous motor. The fans also discharge into individual pipes that extend from the basement of the wood room to a point above the chip bin.

Two Sturtevant planing mill exhausters, one for each screen, furnish the air to convey the sawdust from the screens to the refuse conveyor carrying bark, where it is deposited and conveyed with the bark to the plant of the Alabama Power Company for their use as fuel.

The chip bin is U-shaped and of boiler plate steel con-



LEFT: THE CHIP SCREENS IN THE WOOD ROOM AT MOBILE. RIGHT: THE VACUUM EVAPORATORS.

struction. It extends the full length of the digester room building with the bottom of the bin high enough from the floor to give plenty of head room. The bin has been designed to handle about 600 cords of wood in chip form or enough chips for thirty-six hours supply.

Two steel hoppers on overhead tracks can be easily moved along the bottom of the bin from one digester to another. Such equipment permits easy filling of the digesters.

Pulping Operations

Four measuring tanks for liquor are located on the digester room floor. From these tanks the necessary liquor for any digester charge is drawn.

The digester installation consists of eight Blaw-Knox vertical digesters. Each digester is eight feet, two inches inside diameter and twenty-four feet, six inches high and has a rated capacity of approximately four tons. All of the digesters are completely insulated with 2-inch Johns-Manville canvas covered eighty-five per cent magnesia blocks. Steam lines to the digesters are insulated in the same manner.

Above the digester room floor are four cyclones designed with catch-alls into which the pulp is blown from the digesters and they in turn discharge it into their corresponding diffusers.

The diffuser installation consists of twenty units arranged in a series of circles around a stock chest and with the top on a level with the digester room operating floor and immediately adjacent to it. There are twenty diffusers in each series so that the pulp from any cyclone would under ordinary circumstances be discharged into any one of its related diffusers.

The diffusers are equipped with the ordinary type discharge openings which face the chest into which the stock is discharged.

The pulp contained in the stock chest is pumped to the pulp screens, first receiving a preliminary screening by passing over four Packer flat screens where all oversize material is removed. Following the preliminary screening, the pulp flows by gravity through three Bird pulp screens which in turn discharge the screened pulp to five Oliver thickeners. The thickeners discharge into five Allis-Chalmers rod mills, one mill for each thickener. This discharge from the rod mills passes to a common stock chest installation.

The entire wet room installation is arranged in the form of steps with the row of rod mills as the bottom step, the thickeners the next step above, the Bird screens as the third step, and the Packer screens at the top. Such an installation makes for simplicity and ease of operation.

Liquor Preparation

Four 30-foot diameter black liquor storage tanks, located outside the pulp mill building, receive the black liquor for storage and hold it until needed by the evaporators. The tanks are of boiler plate steel construction. The Swenson quadruple effect evaporator installation, installed on a mezzanine with the units of the evaporator arranged parallel to the row of digesters and on the side of the building facing the recovery plant building, receives the black liquor from storage and evaporates it to a point that can be handled by the disc evaporators.

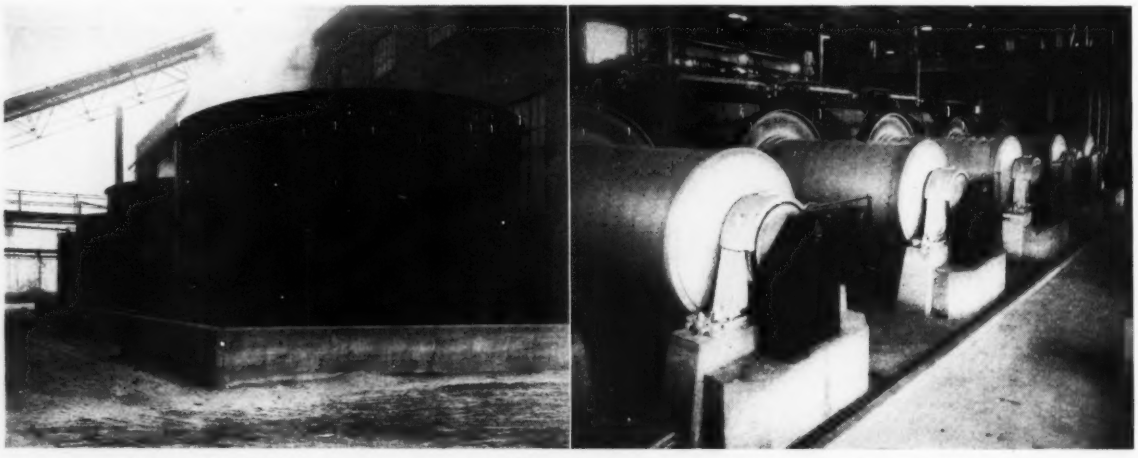
The Swenson evaporator has welded steel bodies, cylindrical in shape, with dished heads, and uses a heating surface made of horizontal tubes. The bodies are twelve feet in diameter, and eighteen feet high, and are designed to take steam at about twenty-five pounds pressure. The quadruple unit discharges vapor from the fourth effect to a Schutte-Koerting multi-jet condenser using a barometric arrangement. The dilute black liquor is fed to the second effect from a liquor heater from which it passes to the third and fourth and then to the first effect in order to take advantage of the higher temperature existing in the first effect.

The partially concentrated black liquor from the Swenson unit is pumped to the recovery plant for further concentration and reduction.

Eight Manitowoc disc evaporators have been installed in this department in conjunction with eight Manitowoc nine-foot by twenty-foot rotary incinerators, eight smelters, and eight dissolving tanks. In this way there are eight separate and distinct sets of equipment.

The hot gases from one smelter pass to and through its corresponding rotary, and the gases from the rotary in turn pass to and through its corresponding disc evaporator.

In the recovery building the smelters extend from the ground floor level upward above the operating floor to a point about level with the top of the rotary incinerators. The rotary incinerators are installed with foundations on the operating floor. The disc evaporators are set up on a structural steel framework with the bottom of the evaporators about nine feet above the floor. In this way the hot gases from the smelters have practically a horizontal travel through the rotaries and disc evaporators. After passing through the



LEFT: THE LIQUOR STORAGE TANKS AT MOBILE. RIGHT: THE SCREEN ROOM AND ROD MILLS.

LEFT: BEATER AND FOURDRINIER MACHINE ROOM. RIGHT: BEATER ROOM BASEMENT, SHOWING THE STOCK PUMPS.

disc evaporators, the gases are brought together in a common flue and led to a stack. The stack is of concrete—nine feet in diameter at the top and 205 feet high. It is used only in connection with the recovery plant.

The further concentrated black liquor from the disc evaporators enters the rotary incinerators where additional evaporation and partial reduction takes place, such evaporation and reduction, in fact, that the discharge from the unit is in the form of ash rather than as a concentrated liquor. To this ash, designated as black ash, enough salt cake is mixed to make up for the loss of alkali in the manufacturing cycle and the mixture fired into the smelting furnaces.

The smelting furnaces are of the cylindrical type—nineteen feet four inches high and twelve feet six inches in diameter. Boiler plate steel, one-quarter inch in thickness, has been used for the shell. The lining for the furnaces is soapstone and is twenty-two inches thick. It is insulated from the shell with special heat resisting material. Both the tops of the smelters and the smelt spouts are water-cooled. The air supply to the units is supplied through three air nozzles to a smelter with the air being furnished for the entire installation by two No. 10 Sturtevant slow speed blowers.

The line of dissolving tanks is installed at a slightly lower level than the base of the smelters. Such an installation permits the smelt to flow freely from the furnaces into the tanks and minimizes any tendency of explosion.

All of the tanks are twelve feet in diameter and nine feet high, and are equipped with mechanical agitators. The tanks were fabricated by Hedges, Walsh, Weidner of Chattanooga.

In the layout for the smelter and dissolving tank installation, provision was made to permit inspection of the smelt discharge from the operating floor. A sufficiently large opening has been left in the floor on the spout side of each unit. This opening is guarded with welded pipe railing. The air supply piping to the smelters is located on the same side of the units as the spouts.

The fan equipment for the smelters units is located on the basement or first floor level of the recovery building. A small, brick enclosed room with the exception of a single door opening is also located on this floor. This room houses all electrical equipment for the department—switches, starting boxes, etc., and thus eliminates any opportunity for trouble with dirt.

The green liquor from the dissolving tanks is pumped to storage. The storage tanks for the green liquor are located at one end and side of the caustic building in space between the caustic building and the recovery building. Six boiler plate steel tanks about twenty-four feet in diameter constitute the storage equipment for the green liquor.

The green liquor is then pumped from storage to the causticizing department section of the caustic building as mentioned previously, is three stories high while the balance of the building is only one story.

Outside of the causticizing equipment, the building contains storage space for both salt cake and lime and shelters the lime recovery kiln. The salt cake is transported from storage through an elevated runway and conveyor to the operating floor of the soda recovery building.

The green liquor is pumped to the causticizer which consists of one large boiler plate steel tank equipped with a large, heavy perforated metal basket and an agitator. In this tank the liquor is causticized with lime and then pumped to four presettling tanks equipped with agitators where the white liquor is decanted and the remainder pumped to ten settling tanks where final settling of the sludge takes place. The sludge, in both cases, is pumped to three Mount filters where it is recovered in cake form allowing the liquor to go back to storage for supply dissolving tanks.

The final settling tanks are also equipped with agitators for both mechanical and air separation. Two line shafts, one to five tanks, equipped with throw-out clutches operate the agitator equipment. The clear liquor is decanted from these tanks through a four-inch pipe to storage.

The causticizing tank is located on the first floor of the caustic building near space allotted to lime storage and close to lime recovery kiln. The other tanks are installed on the second floor of the building but extend upward and through the third floor.

The lime mud from the three Mount filters is conveyed to a Vulcan nine-foot by 110-foot lime recovery kiln where it is recalcined for use again in causticizing. The lime kiln is lined with LaClede Christy Superfrax.

On the first floor of the caustic building are also located a number of Goulds Pumps, Inc., and Baker Manufacturing Co. centrifugal pumps, and an Imperial type Ingersoll-Rand air compressor. The centrifugal pumps are used in handling sludges and liquors in the department, while the air compressor furnishes air for agitation.

Beating and Refining

The pulp stock, ready for additional treatment before fab-

rication into a sheet of paper, is treated in Dilts beaters and Shartle jordans.

The beater installation consists of six specially designed Dilts high speed seventy-two-inch by sixty-inch beaters, three for each of two 210-inch fourdriniers. The tub sides are of cast iron with an inside length of thirty feet. The bottoms are of concrete with a width of 116 inches. Two additional beater units with rolls sixty-six inches by sixty inches are used for the Yankee machine. The beaters are all individually driven through a short center tentacular drive and synchronous motor.

After the stock has received proper treatment in the beaters, it is passed through the jordans. The jordan installation consists of ten Miami No. 6 for the two fourdriniers, and three Miami No. 2 for the Yankee. All of the jordans are directly connected to synchronous motors.

The beaters and jordans are located in the same room and on the same floor level as the three paper machines.

Paper Machines

Two Beloit fourdriniers are practically duplicates of one another and are designed to operate 1,000 feet per minute. Each machine has a wire 210 inches wide and eighty feet long. The wire part of each machine is of the Beloit patented type which is adjustable as to height and removable as a unit from the breast roll to and including guide roll, table rolls, wire rolls, save-alls, and suction boxes. Likewise, the wire parts are equipped with the Aldrich high speed, motor driven shake which can be adjusted while running as to speed and length of stroke.

All of the wire rolls, table rolls, and the breast rolls for the two 210-inch fourdriniers are carried in Timken roller bearings. There are six suction boxes on each machine. The boxes are of non-corrosive metal and are equipped with maple covers. The boxes are arranged to oscillate.

The couch roll on each machine is of the Beloit cantilever suction type and is thirty-six inches in diameter. Each roll has a direct drive and is equipped with a cantilever device on the rear journal to support the roll, while changing wires, in an overhung position. No crane is necessary in changing wires with this type of roll when it is used with the Beloit patented wire carriage.

The vacuum requirements of the fourdinier parts of the two fourdrinier machines is met with Nash vacuum pumps.

The press sections of the machines are of special design for producing kraft paper at high speed. The first press of each machine consists of a direct driven, thirty-inch diameter, Beloit suction press roll and a rubber covered top-pressure roll. Both the top and bottom rolls are mounted in anti-friction bearings. The second press rolls of these machines are both rubber covered, while the third press is equipped with a rubber covered bottom roll and a granite top roll. These rolls are carried in Timken roller bearings. Each press is equipped with a doctor and broke conveyor to carry "broke" to the front side of the machine.

The felt rolls on the presses are also rubber covered and are mounted in Timken bearings.

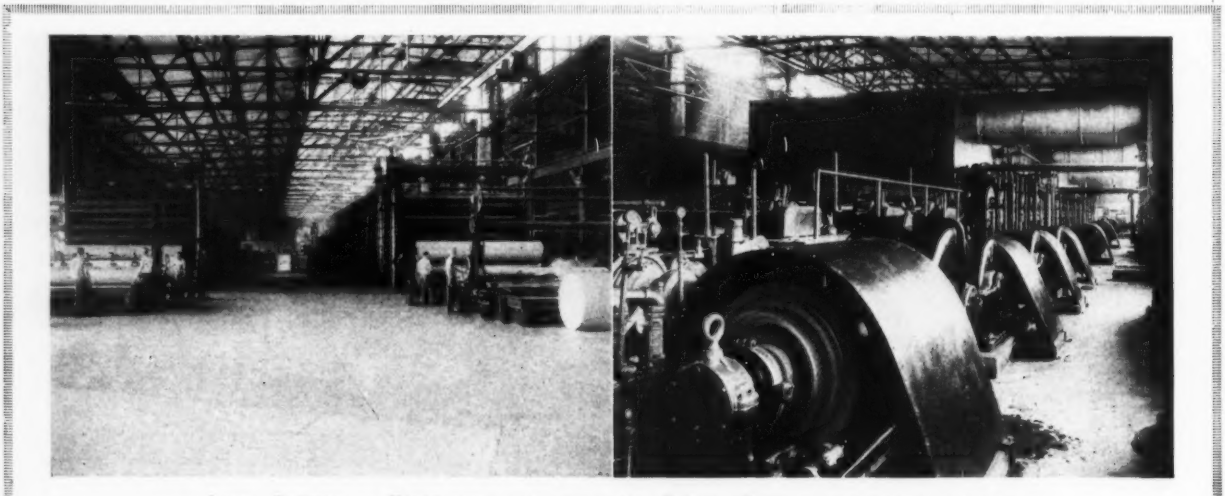
One of the two machines is equipped with a smoothing press which is mounted on the drier frames.

The fourdriners have thirty-eight sixty-inch diameter driers on each machine. The driers are bored inside, are carefully turned and given a high polish. Each drier is mounted on Timken roller bearings and is provided with a continuous circulating and filtering oiling system. The driers are driven by a silent chain drive which is enclosed and designed to run in oil. The drive is likewise designed to prevent all backlash and is practically noiseless in operation. The sprokets on the drier journals are approximately one-half the diameter of ordinary gears. Such a drive makes the backside of the drier section as convenient for the operator as the front side. It even permits the removal of "broke" from the backside.

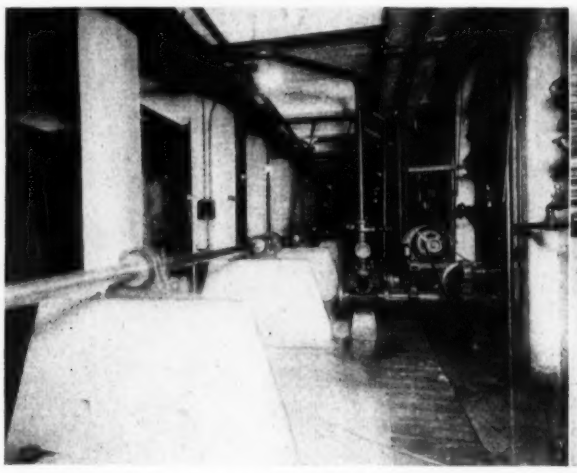
One of the two fourdriniers has only one stack of calenders with eight rolls in the stack. The second machine, the machine with the smoothing press, has two stacks of calenders with eight rolls in each stack. All of the calender rolls are equipped with collar oiling bearings. A motor lift is provided for raising and lowering the rolls in each stack.

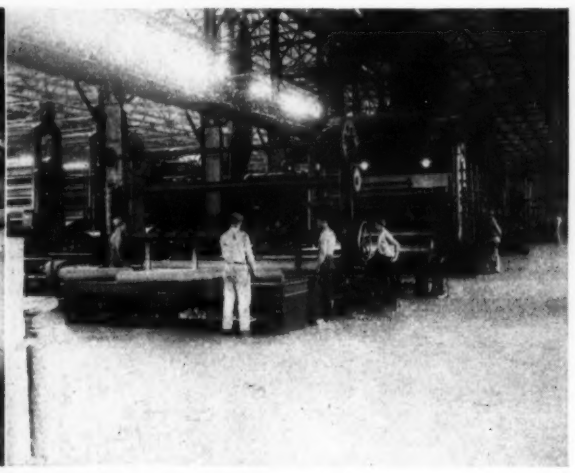
The reel in each of the two fourdriniers is of the improved Aldrich uniform speed type. The main drum is thirty-six inches in diameter and is mounted in Timken bearings. The steel paper-reeling spools are also mounted in Timken bearings. Heavy water-cooled unwinding stands are supplied for unwinding the paper from the spools to the winder. Tension is applied to the unwinding shaft by means of an air brake which can be quickly and easily regulated.

Each winder on the two fourdriniers is equipped with Beloit's latest improved double-drum winder and slitter. This winder was designed for safe operation at high speed and is very heavy construction. The finished roll of paper is removed from the winder automatically without the use of a



LEFT: INTERIOR OF FOURDRINIER MACHINE ROOM. RIGHT: DRIVE SIDE OF NO. 1 MACHINE.





LEFT: BASEMENT OF NO. 1 MACHINE, DRIVE SIDE. RIGHT: THE YANKEE MACHINE IN MOBILE PLANT.

crane. A small roll in arms is located directly behind the back winder drum. The arms, raised by air, cause the small roll to push the finished roll of paper from the winder on to a platform. It is also possible, by operating an air valve lever, to raise or lower a saw tooth slitter attachment, and to apply an air brake to quickly stop the winder. The mountings for all running parts of the winders are roller bearings.

The slitter part of the winder is low and has been designed to permit the operator to easily manipulate the paper. The bottom slitters are mounted on individual motors and can be easily adjusted for various widths of sheets.

Beloit spiral bevel gear drives are used to connect the main drive to the various sections of the machine. The gears and pulley shafts are mounted in roller bearings. These drives are provided with an oiling system which premit the gears and pinions of hardened steel to constantly run in a bath of oil and to oil automatically the bearings inside the gear housings. The drives are operated by means of a hydraulic friction shifter with a control valve located in a convenient place on the front side of the machine.

The third machine is a Yankee machine which is said to be the widest machine of this kind in the world. This machine is equipped with a wire 172 inches wide and sixty feet long, and is designed to operate at 600 feet per minute. The wire part of the Yankee, as in the case of the two fourdriniers, is of the Beloit patented type. This part is designed to permit adjustment as to height and to be removed as a unit from the breast roll to and including the guide roll, table rolls, wire rolls, save-alls and suction boxes. It is equipped with an Aldrich high speed motor driven shake which permits adjustment, while in operation, as to number and length of strokes.

The table rolls, wire rolls, and breast roll of the machine are carried in Timken roller bearings. The fourdrinier part is also supplied with three suction boxes of stainless steel equipped with hard maple covers. The boxes are arranged to oscillate.

The couch roll is thirty-two inches in diameter and is of the Beloit patented cantilever suction type. It has a direct drive and is arranged with a cantilever device on the rear journal to support the roll, when changing the wire, in an overhung position. The couch is also supplied with a top couch roll which can be used with a pick-up felt to deliver lightweight paper to the driers. This roll is provided with a motor lift.

The press section consists of one pair of press rolls. Both of the rolls are rubber covered and are mounted on Timken roller bearings. The felt rolls are also rubber covered and mounted in Timken bearings. The top felt of the press section has been designed to run as a pick-up felt.

A thirty-six inch pick-up drier with a rubber covered pressure roll has been provided for use when running the pick-up felt. The drier has an extra thick shell, has been specially ground, and is mounted in Timken bearings.

The drier section consists of six driers preceding and four driers following the Yankee drier. The section preceding the Yankee drier is mounted two-deck and is equipped with Timken bearings. These are lubricated by a continuous oiling and filtering system. These driers are driven by a silent chain drive. This drive is enclosed and designed to run in oil. A Sheahan rope carrier carries the paper through this section of the driers to the Yankee drier.

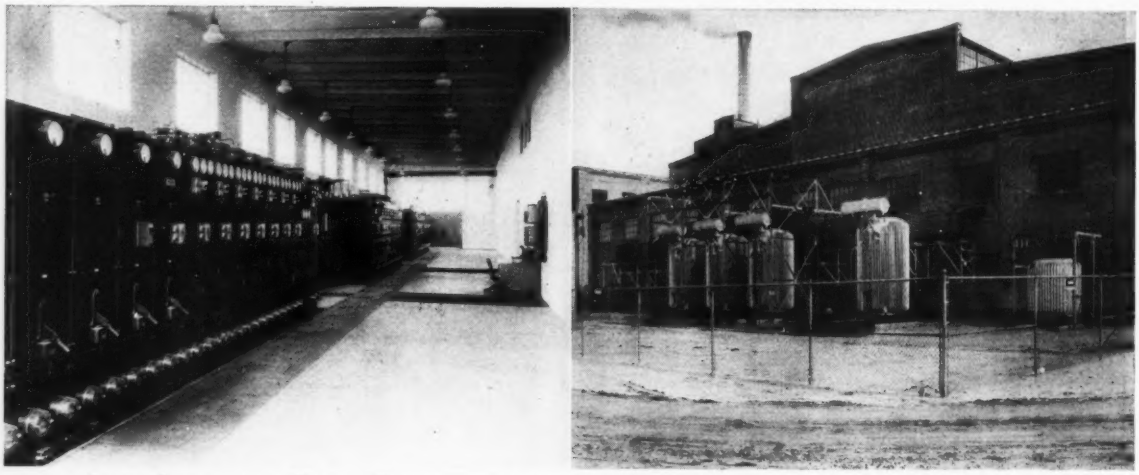
The Yankee drier, said to be the largest drier built, is twelve feet in diameter, and has a 177-inch face. It is bored inside and finished outside with a very high polish. This drier is equipped with two heavy vibrating doctors, and two pressure rolls and a dampering felt under the drier. The pressure rolls are equipped with a quick release arrangement, while the dampening felt is equipped with brass felt rolls.

The driers following the Yankee driers, like those preceding, are mounted two-deck in Timken bearings. The bearings are also connected to the oiling and filtering system which serves the preceding driers. The driers are driven by a silent chain drive.

A five-roll stack of calenders constitutes the calender arrangement for the machine. The rolls are equipped with collar oiling bearings and a motor lift.

An improved Aldrich uniform speed reel and a Beloit improved double-drum winder and a slitter constitute the slitting and winding equipment of the machine. The main drum of the reel is thirty-six inches in diameter and is equipped with steel paper reeling spools. Both the main drum and reeling spools are mounted in Timken bearings. The unwinding stands are water-cooled and of heavy construction. The tension is applied to the unwinding shaft by means of an air brake for quick and easy adjustment. The winder and slitter were designed for safe operation at high speed and operate in the same manner as similar equipment on the two fourdriniers.

The drive on the machine is similar to the drives on the four-



LEFT: SWITCHBOARD. RIGHT: TRANSFORMERS IN WHICH INCOMING ENERGY IS STEPPED DOWN FOR MILL USE.

driniers. Beloit spiral bevel gears connect the main drive to the various sections of the machine. The gears and pulley shafts are mounted in roller bearings. Gears and pinions are hardened steel. The drives are provided with an oiling system to keep the gears and pinions constantly running in a bath of oil and to automatically oil the bearings inside and outside the gear housings. The drives are operated by means of an hydraulic friction shifter with a control valve located in a convenient place on the front side of the machine. Each of the two fourdriniers is driven through an individual 400 h. p. Terry steam turbine, while a 225 hp. unit is used to drive the Yankee machine.

The Fulton system of drainage control is used on each of the machines for circulating steam and removing condensate from the driers. Each machine is also equipped with an individual Bowser oil system, two Victory felt conditioners, and Frossard doctors for the driers and other parts of the machine.

Machine Shop

Appreciating the importance of speed in all repair work, the machine shop was designed to handle any repair job that might be received in the course of a day's work.

The major equipment installed in the shop includes the following:

1 24-ft. Gould and Eberhardt shaper—back geared.
2 16-inch Canady floor type grinders.
1 American radial drill press 3½-inch radius.
1 24-inch sliding head drill.
1 Foote-Burt bolt cutter.
1 24-inch by 14-foot LeBland lathe.
1 20-inch by 14-foot Lodge & Shipley lathe.
1 42-inch by 22-foot Bradford lathe.
1 24-inch Cincinnati shaper.
1 LeBland Universal slitter grinder.
1 Rock River 48-inch throat style punch and shear.

In addition to the shop equipment is a Farrel roll grinder. This grinder is located in the finishing room at a point under a monorail conveyor to permit easy handling of rolls. The grinder, as in common practice, is supported on a foundation entirely free from the building to avoid any difficulty from vibration.

A blacksmith shop adjoining the machine shop completes the items relating to shop equipment.

Housed in the same building as the blacksmith shop and machine shop is the storeroom or supply house and the oil house. All spare parts, belting, fittings, tools, etc., that are required for a mill of this kind are conveniently stored in the supply house. The oil house serves simply as a storage for oils and greases.

The laboratory, housed in the laboratory and first aid building, has not been designed as a research laboratory but rather for mill control. All general laboratory equipment and apparatus were supplied by Sargent & Co. The specific pulp and paper testing equipment has been purchased from various sources and includes: three automatic Mullen testers; two Elmendorf tearing testers; one Schopper folding endurance tester; one Schopper tensile strength machine; one Ingersoll glarimeter; one La Motte comparator; one Valley sheet machine with hydraulic press, couch mold, and oven; one Williams paper testing oven; one Williams pulp testing oven; and one Cady micrometer Type M.

Miscellaneous Equipment

Most of the equipment in the plant is direct-connected to individual motors. Rubber belting has been used for the belt driven machines. There are 195 motors in the pulp and paper mill and all of them are Allis-Chalmers. Practically all of the process pumps, with the exceptions of stock pumps and pumps in caustic room, are Allis-Chalmers. Beloit plunger pumps have been used for stock, while Goulds Manufacturing Company and Baker Manufacturing Company supplied the pumps for the causticizing department. Nash Hytor units have been used as vacuum pumps on the flat boxes, suction couches, and suction presses of the various machines. Chain for all wood conveyors was supplied by the Chain Belt Company of Milwaukee. Push button control was established on all electrically driven equipment throughout the plant.

The pulp and paper produced by the plant is to be weighed on five Howe Weightographs. One fifteen-ton Stupp crane with span of ninety-seven feet nine inches, is installed over the two fourdrinier machines and a twelve-ton Stupp crane with a fifty-one foot span is located over the Yankee. A Pax automatic telephone system with seventy-five stations has been installed to permit easy communication throughout the entire plant. The shipping platform on either side of the main building is sufficiently long to permit spotting of 16 cars on a side. The platforms have been built just car door height. An overhead trolley system conveys the paper from the machine room to the finishing, shipping, and bag room. A Seybold sheet cutter, Camachine slitter and rewinder, Beloit sheet cutters, and a Moore & White layboy constitute other items of equipment. An air compressor unit has also been installed in the basement of the main building to supply the air needs of the department. Three sixty-two-inch by forty-eight-inch Dilts continuous broke beaters are located in the basement near the finishing end of each paper machine to handle the "broke."

Everett Sulphite Pulp Mill Has New Features

Special Design Saw Mill Manufactures Wood In Most Suitable Manner to Insure Maximum of Cleanliness and Uniformity of Chips—Double System of Washing and Processing Pulp Sure Method of Eliminating Question of Uniformity

THE Everett, Wash., plant of the Puget Sound Pulp and Timber Company was founded as an outgrowth of the experience of use of waste wood of various kinds and the limited use of forest wood and splitting of logs and the plant has been built embodying a complete specially designed saw mill to break down the camp run of pulp timber from merchantable logs delivered in standard log rafts to the pond. The theory is that if high quality pulp is to be made it is necessary to use pulp wood from the best virgin pulp timber and that no particular economies are involved in the combination of sawing lumber and pulp wood on the same head rig in a saw mill.

In other words, it does not cost very much money to sort the logs in the water should the time ever arrive when sawing of hemlock lumber would be so profitable that it would be inadvisable to cut the best logs into pulp wood, and it would be cheaper to sort these good logs then and saw it in the lumber mill, which is designed for sawing lumber in an efficient manner. The Everett saw mill, however, is built with the provision of a second side to it, so that if the time ever arrives that hemlock lumber is more profitable than pulp the company can also saw lumber in this plant, but it is the present opinion that this time is a long distance off and the company is set out on a program to make the best possible pulp under the best of conditions and the wood is the most important part in getting these results.

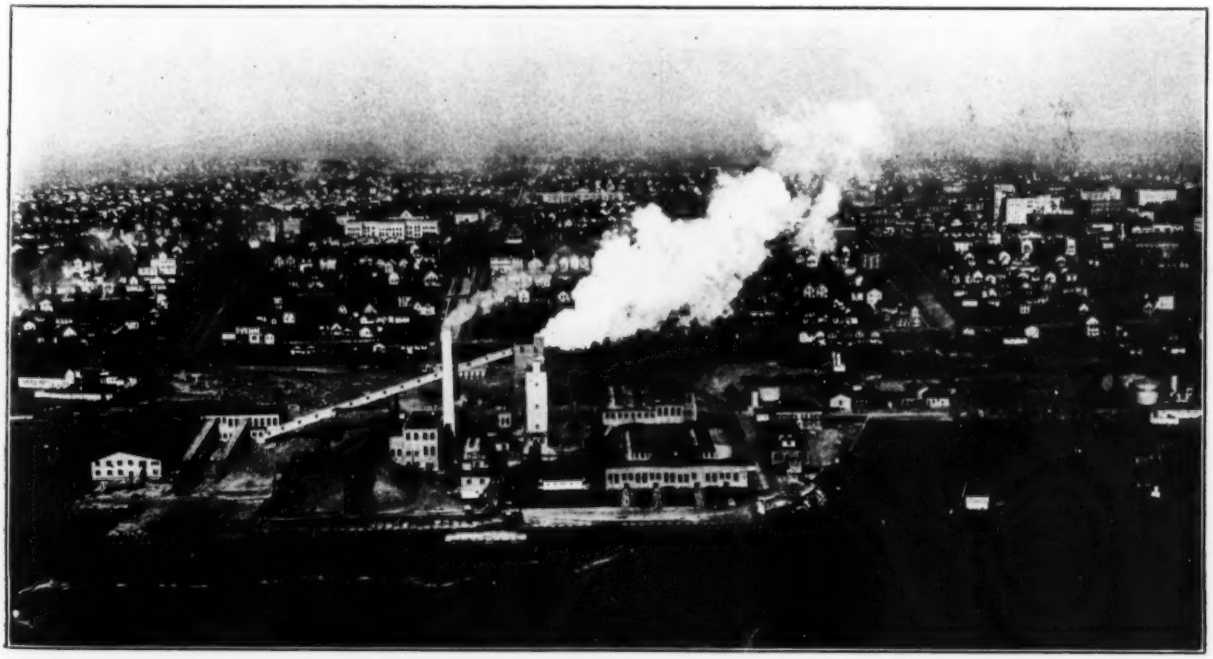
Two-Side Saw Mill

The saw mill, as stated, is built for a two-side mill. One side has been installed, the head rig consisting of two 60 inch circular saws and special high speed carriage, tapered blocks on the carriage, with ample power to break down a minimum of 200,000 feet of logs in eight hours. The carriage is a regular eastern pine carriage and the reason for using circular saws is that the saw kerf is principally taken out of the sap when breaking down logs as much as possible to Jap squares and have chippers that will take up to 20 inches by 20 inches, thus eliminating saw kerf. The circular saws instead of band rig have a further advantage in that they avoid pulling the tannic bark or hemlock bark into the surface of the wood, which is experienced in using a band mill with the relatively small freeness of tooth as against the tooth on a circular saw traveling in a cycle instead of straight up and down.

This feature has demonstrated itself already and is of major importance. The circular saws furthermore permit sawing the hemlock logs at much higher speed as more carriage speed can be used against the circular saw than against the band saw and do not have the objection in hitting the rough knots on hemlock with circular saws as on a band. The difference between the loss of saw kerf between a circular saw under the company's method of sawing the log on a taper is insignificant and does not equal the monetary cost of maintaining a complete filing room such as is required for a band mill.

Automatic Trimmer Installed

In addition to an edger equipped with power shifters, there is an automatic trimmer arranged with three discharge conveyors. The wood is automatically sorted without any hand labor into three lengths. The 2 foot to 4 foot wood goes into the first drop behind the trimmer and goes through a special inspection and cleaning taking any defects out of it through barking or bolting. The clean side cut wood, being 3 inches to 6 inches



AIR VIEW OF THE SULPHITE PLANT OF THE PUGET SOUND PULP & TIMBER CO., EVERETT, WASH.

in thickness, is cut 6 feet and goes direct through the washing system on a separate conveyor to the automatic feed chippers in the chipper mill, being joined after the cleaning process with the first named wood. The large wood, representing 10 inches by 12 inch to 20 inch by 20 inch squares is cut into 8 foot lengths and goes through a washing system on a separate conveyor into the chipper mill to the large 110 inch chippers.

All of the motors for the saw mill are double race ball bearing, synchronous motors having been used in every case where the load factor is over 40 h.p. All of the refuse of any kind, bark, sawdust and rejected wood, passes through two diamond double disk hogs and is converted into fuel. No burner is provided in connection with this operation and all waste of every kind is used in the boiler plant.

The Chipper Mill

The chipper mill consists of two rows of steel belts each 46 inches in width conveying the wood to the chippers. On No. 1 steel belt all of the large wood goes to two 110 inch KMW special design log or cant chippers. A new feature has been added to these machines for this mill in that the degree of the slope of the feed spout has been changed, having an opening 22 inches by 22 inches square and the spout is provided with a bed plate both on the bottom as well as on the side, preventing the wearing of spout lining to affect the successful chipping of the wood, regardless of size.

The second set of chippers consists of 84 inch KMW automatic feed chippers which take all of the wood of variable size under 6 inches also varying in length. The chippers are of Swedish design and manufacture. Chips are screened over three latest type chip screens and conveyed on a 40 inch inclined rubber belt to the top of the digester building. For washing the wood a special hot water well is provided in the chipper building with a pump giving the wood a thorough washing before it is passed to the chippers. This pump is also used for washing the logs on the log slip.

The new machinery includes eight-four 14-plate flat diaphragm screens, seven-unit pulp washer, and three Valley-Voith screw presses installed by the Valley Iron Works, Appleton, Wis.

Digester Mill Building

The digester mill building is exceptionally high and provision is made for chip storage above the digesters sufficient for three charges above each digester. The bins are so designed that no steam or other apparatus is required to quickly load the digesters. The digester equipment consists of five eighteen and one-half ton yield digests, tall and narrow to permit of circulation in the cubic area provided. These digesters are provided for three different methods of cooking—either direct quick cooking or slow cooking with washout of the stock and provisions have been made for converting them to the Mitscherlich system should the occasion arise.

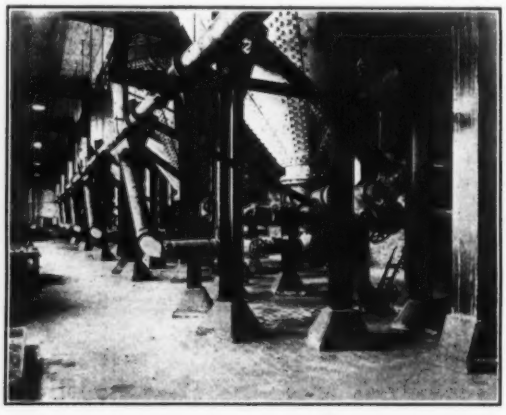
All of the fittings on the digesters, including the special large 16-inch blow valves are of acid proof bronze. The blow lines, of heavy cast iron, are on a downward slope into large roomy rectangular blow pits. These blow pits are made of concrete, lined with fir tank lining inside. The blow pit bottoms are lined with acid proof tile and false drainer bottom consists of special drainer tile manufactured in Sweden, insuring length of life and maximum of quick flowing and washing area.

BLEACHER HEADS

The Washing System

The washing system employed consists of storage tanks located directly on top of the blow pits, permitting hot water washing and flooding of the pits in the shortest possible time. From the blow pits the stock goes into the large concrete suction pit and is pumped therefrom to the mixing box over knotters and then washed over regular washers. This is a unique feature in this plant in that a double washing of the stock is had before processing commences. From the washers the brown stock passes through KMW Swedish separators combing the fibers apart and insuring maximum freeness of the stock. The stock enters these separators at 7 per cent consistency and these separators are the first of their kind installed on this side. They are, however, used in all of the high-grade Swedish mills. From these separators the stock drops down into large agitating and

BOILER HOUSE-HOG FUEL FEED



FIVE 19-TON DIGESTERS

blending tanks of wood construction, having capacity to blend the batches produced in the digester mill at that consistency.

From the blending of the stock it is pumped up to mixing boxes and passed over brown stock rifflers of exceptionally large capacity, giving ample time for complete riffling of the brown stock before passing over a battery of 56 14-plate flat screens. These screens are operated in series of choice stock with a flowing principle employed so that no dry screening is allowed. The choice stock is drawn off and second choice stock is again re-screened over separate rows of brown stock screens. From these screens the stock passes on to the brown stock storage chests under the bleachers, ready for washing before the bleaching.

The Bleaching Plant

The bleaching plant consists of the latest improved Wolfe 2-stage bleaching system. All of the bleachers, both first and second stage, are completely tile lined as well as the conveying trough to the bleachers. From the bleach washers the stock is again pumped up to a mixing box, passing over a complete set of bleach stock rifflers and over a battery of 34 14-plate flat screens for second screening before going through thickeners into the machine chests at the head of the drying machines. No screen plates are used in the plant with a cut over .008 insuring a maximum of cleanliness.

Improved Pulp Drying Equipment

The driers consist of two 154-inch 34-5 feet 6 inches diameter of cylinder Fourdrinier drying machines equipped with felt presses and Peterson pre-driers, having a capacity of 100 tons each in 24 hours with drying at 6 pounds of steam pressure. These machines are the latest type of improved pulp drying equipment used on high grade pulp in Sweden. The purpose of using two machines of such large capacity for the manufacture of 175 tons of pulp is to permit a relatively thin sheet to be formed with perfect formation on the Fourdrinier wire and allow drying with minimum temperature so as to insure against loss in strength of fiber through the drying process. The drying equipment is of the best and latest to insure maintenance of the inherent strength of the fiber into the finished bale. The driers are provided with a preheated air fan system and the whole drier room

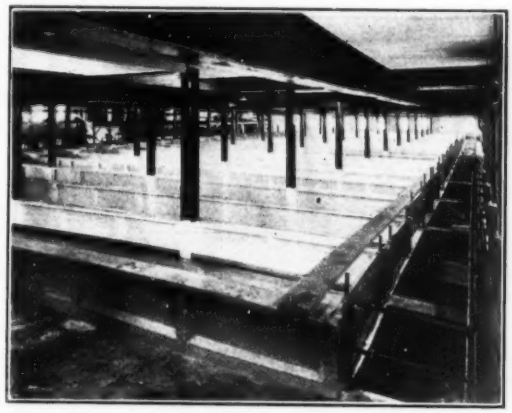
DRYING MACHINE ROOM

is under pressure of washed air through air washer insuring maximum of cleanliness in the drying room.

The plant is equipped with two Biffar machines manufactured in Germany for converting all of the rejects throughout the processing of the pulp, knots and or tailings into refined screenings. These pass over a single press wet machine and are made into usual size packages for shipment to roofing mills. The baling equipment consists of three balers and after baling the bales are carried by an overhead monorail carriage into pulp storage ready for shipment by rail and or water.

Boiler Plant Economical

The boiler plant has a generating capacity of 8,000 h.p., being equipped for economical burning of either hog fuel or oil, having a double furnace. The hot air from the stack is used over through a pre-heater air installation to economize on fuel. All



RIFFLER FLOOR

of the condensate from the plant, including the turbines driving the pulp machines, is taken back to the boiler plant. Another feature for safety in connection with the general cleanliness around the plant is the installation of complete cinder cone burners to prevent any cinders around the plant.

The complete Jenssen acid plant has an added new feature on the Coast of a skip hoist lift for handling stock to the towers without any man-power at the discharge end of this lift. The sulphur, limestone and lime is handled on an overhead railroad from shipside directly into the various storages for chemicals eliminating rehandling of any sort in connection with chemicals.

Bleach Liquor Plant

The bleach liquor plant is a complete installation equipped to handle either burned or hydrate lime, chlorine cars being tracked directly at the bleach liquor plant and are connected to this operation directly from the tank car, eliminating use of chlorine containers. All process water for the plant is passed through a complete filtration plant equipped for treating the water and although the best pure mountain water is furnished by the City of Everett, this filtration plant was put in as an additional safeguard. A complete control and research laboratory is erected and equipped in a most convenient place between the various buildings.

Summing up the new features of this plant as comparing with most of the high grade mills in this country and Canada, it might be said that this company uses the best of the forest, has a special design saw mill to manufacture the wood in the most suitable way to insure maximum of cleanliness and uniformity of chips.

The digester mill is equipped so as to permit the obtaining of the rated capacity of the plant with a long cooking time of 15 to 16 hours.

The washing and processing of the pulp is a double system throughout with the new features of fiber combing and complete blending to insure uniformity. The manufacturing of sulphite is a batch system and to eliminate the question of uniformity undoubtedly this is the only sure method of doing so.

Hayton Pump Installation

At the new mill of the Puget Sound Pulp and Timber Company, will be found four of the Hayton Pump and Blower Company's so-called Combination Pumps. These pumps serve the double purpose of providing agitation of the stock in a

CONVEYOR SYSTEM INSTALLED BY RYTHER & PRINGLE CO. AT NATIONAL PAPER PRODUCTS PLANT, CARTHAGE, N. Y.

chest and at the same time transferring part of the stock to some other part of the paper making process.

One of these pumps combines a No. 16 Agitator Pump with a 8 inch Centrifugal Pump, and is connected to a chest containing 2½ to 3½ per cent bleached stock. 4000 G. P. M. is handled by the agitator; and of this quantity, about 1300 G. P. M. is transferred to the riffilers by the centrifugal pump.

Another of these pumps combines a No. 20 Agitator with a 10-inch Centrifugal Pump and is connected to a chest containing 1 to 2 per cent brown, blow pit stock. 6000 G. P. M. is handled by the agitator; and of this quantity, about 2600 G. P. M. is transferred to the knotters.

The other two pumps are No. 16 Agitators combined with 6-inch Centrifugal Pumps, and handle 2½ to 3½ per cent bleached stock. The No. 16 Agitator pumps have a capacity of 4000 G. P. M. each; and of this quantity, about 650 G. P. M. is transferred by each centrifugal to the mixing boxes.

These combination pumps have been developed by the Hayton Pump and Blower Company, Appleton, Wis. The agitator pump part of the Combination Unit is a low head, large capacity pump, for use on agitation and other low head work; while the centrifugal part is a standard centrifugal pump; but the unit is so constructed that the centrifugal pump suction is connected to the discharge chamber of the agitator, so that the centrifugal is always provided with stock under a constant head. This construction makes it possible to empty a chest completely without variation in the quantity handled by the centrifugal pump, and at the same time prevents the centrifugal pump from becoming air bound.

The plant facilities for shipping and handling its material are unique from an economical standpoint in that the company has its own shipping terminal and is independent as to supply of all of its raw material, having its own large timber holdings and railroad and logging operations directly connected to the plant with a stand of the best pulp timber in the State of Washington as far as quality and accessibility is concerned.

The company's chemicals are supplied directly to the dock from ship or barge, the company using its own limestone and the only raw material purchased from outside source is chlorine and sulphur.

Ryther & Pringle Co. Institute New Department

In addition to their Foundry and Machine Shop operations, the Ryther & Pringle Company of Carthage, N. Y., have instituted a new department for the fabrication of steel. The fabricating is done by the electric arc welding process and while no attempt has been made to enter into building construction, a great deal of work has been accomplished in the way of special equipment for industrial purposes during the past year.

Considerable equipment to facilitate the work in this department has already been installed and other items will be added as rapidly as the business warrants. Sufficiently increased stocks of steel are carried at all times to insure prompt service to the trade.

The arc welding process of fabrication has many decided advantages over riveted construction and is steadily growing in popularity. The institution of this department should prove a decided advantage to industrial plants located within the territory which may logically be served by the Ryther & Pringle Company.

The illustration presented herewith shows a Conveyor System installed at the plant of the National Paper Products Company, Carthage, N. Y., manufactured by the Ryther & Pringle Company.

Recent Improvements at Mount Holly Mill

Among the most recent changes and improvements at the Mount Holly mill of Curtis and Brother Company of Newark, Del., are completing the installation of electrifying the entire mill. The principle part of which is an electric drive for the paper machine using the General Electric Company's variable speed drive.

Modernizing of the drier system on the paper machine.

Rebuilding various parts of the machine including installation of the newest Moore and White improved rotary screen.

Beaters and washers have been entirely rebuilt.

A new and complete Sprinkler System, with 50,000 gallon water tank, has been completed and installed for fire protection, and the other parts of the mill have been renovated so as to have everything modern with the view of greatly improving the quality of the paper and increasing the daily production by about 30 per cent.

New Olympic Forest Pulp Mill In Operation

Bleached Sulphite Pulp Plant at Port Angeles, Wash., Began Production Last June—Installation of Modern Machinery Assures Production of 175 Tons of 106 Per Cent Air-Dry Pulp Every Day—Plant Ideally Located

DESIGNED as a lumber and bleached sulphite pulp plant, the new mill of the Olympic Forest Products Company, at Port Angeles, Washington, began production on June 9, 1930, with the blowing of the first digester. The mill has a 1,200 foot wharf, 200 feet wide, which is capable of accommodating any ocean vessel. All ocean and inter-coastal traffic passing in to Puget Sound, or Vancouver, B. C., passes directly by the mill site. The Olympic Division of the Milwaukee Railroad traverses the mill site, while the paved highway for automobile traffic is only half a mile away.

Chris Kuppler's Sons, contractors, builders of several pulp and paper mills on the Pacific Coast, erected the Olympic Forest Products plant on the site of the old saw mill at Ennis Creek. The brick structure housing the steam and power plant of the old saw mill was remodeled and now houses a modern high pressure steam and power plant. The saw mill has been entirely rebuilt and now conforms to modern ideas. All of the saw mill buildings are of frame construction, as is also the chip storage building and pulp warehouse. The acid plant and digester buildings are built of steel and concrete.

Equipped With Modern Machinery

The saw mill includes a planer and a remanufacturing plant, equipped with the latest machinery and designed to handle a volume output with a minimum of labor. The saw mill unit has a designed capacity of 160,000 feet of lumber every eight hours, but actual operations have indicated that the mill will function on a 50 per cent over capacity, employing only fifty men per eight hour shift.

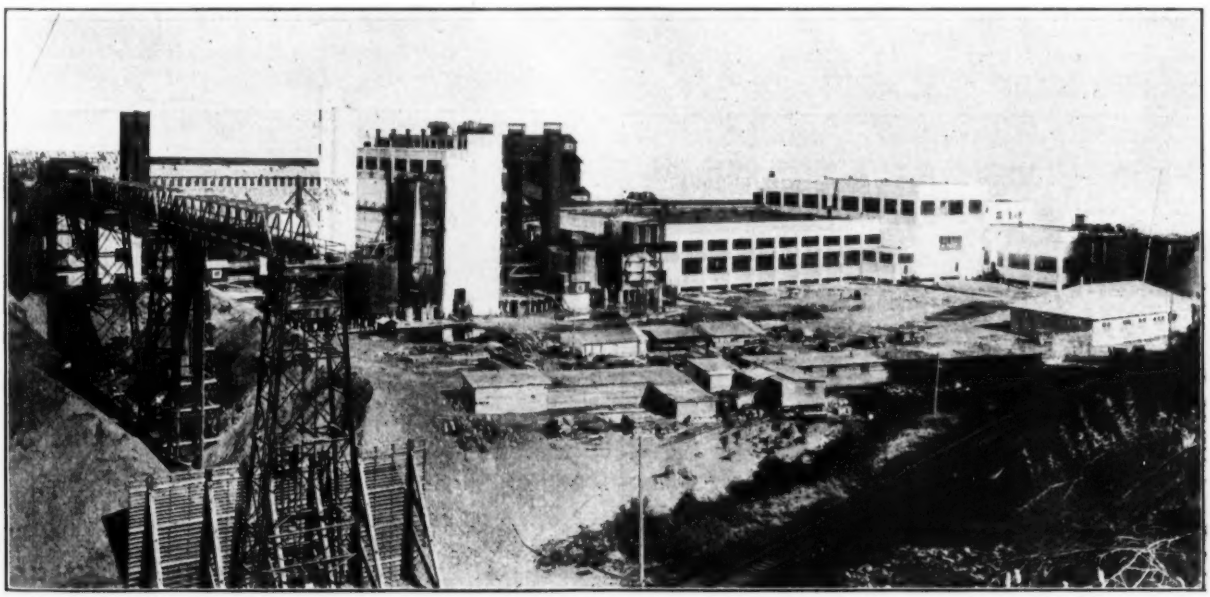
Located at one end of the saw mill is the wood room, where the pulpwood is prepared. The design of the wood room was largely under the supervision of the Webster, Brinkley Company, of Seattle, and generally follows the design used by this company in other Pacific Coast installations. All accepted clean pulpwood is delivered by steel conveyors to Carthage chippers of different sizes, from which the wood travels as raw chips on rubber belt conveyors to a battery of nine Leahy inclined vibrating screens, to be refined.

Westinghouse motors drive the chippers through Dayton Cog-Belt drives, a combination which is used extensively throughout the mill. Merrick Weightometers are installed on rubber belt conveyors to weigh both accepted chips and hogged fuel *en route*. The chip storage bin is capable of storing 1,200 units, each of 200 cubic feet, is 92 feet high, 54 feet wide and 170 feet long. On the dock opposite the chip storage bin, an unloaded hopper and conveyor belt to storage permits the mill to draw chips from scows coming from outside chip sources, if necessary.

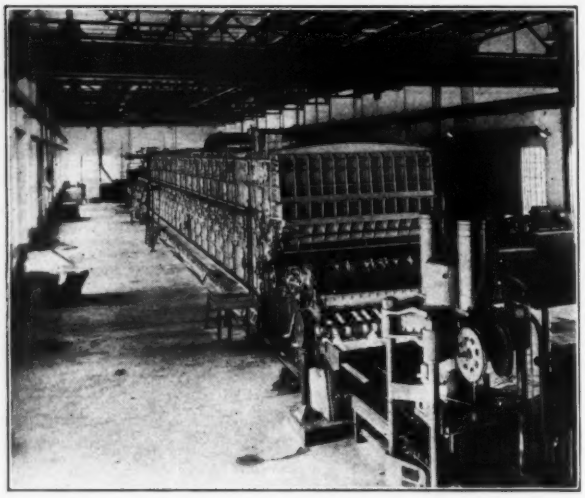
Chemipulp Process Installed

Incidentally, this mill is the first on the Pacific Coast to install the Chemipulp process, which covers a means of recovering waste heat and absorbing sulphur dioxide, under pressure, while the same is being relieved from digesters during cooking time. The acid plant is the standard Jenssen two-tower system, equipped with two Glens Falls burners, with sulphur melting pots, heated partially from the hot burner. From the burner room, proper, the gas passes into a Jenssen cooler outdoors and from there into the acid absorption system.

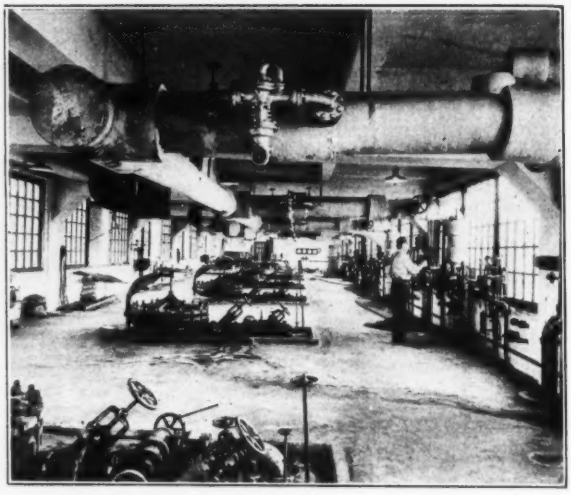
It is interesting to note that the digester building is a concrete and steel structure of less altitude than customary, a feature made possible by divorcing chip storage from the digester building and placing it on ground level. Cooking is carried on in five 15 by 56 foot digesters, built by the Commercial Boiler Works, of Seattle, and fitted with standard 7½ inch Stebbins lining. The Doran Company, of Seattle, supplied bronze valves



SULPHITE PULP MILL OF THE OLYMPIC FOREST PRODUCTS CO., PORT ANGELES, WASH.



MINTON VACUUM DRIER AND BALING PRESSES



OPERATING FLOOR OF DIGESTER BUILDING

and fittings for the digester, accumulator and acid tank hook-ups.

In a normal operating day the plant must handle more than 200,000 feet of lumber, 175 tons of finished pulp in bales, lime rock and sulphur sufficient for that quantity of pulp in manufacture. Two most mobile pieces of equipment are the Willamette-Ersted carriers. These carriers can drive over a load of six to ten tons, pick it up in a few seconds, and whisk it away in either forward or reverse at sixteen miles per hour. In the machine room and pulp warehouse several Elwell-Parker electric trucks are used.

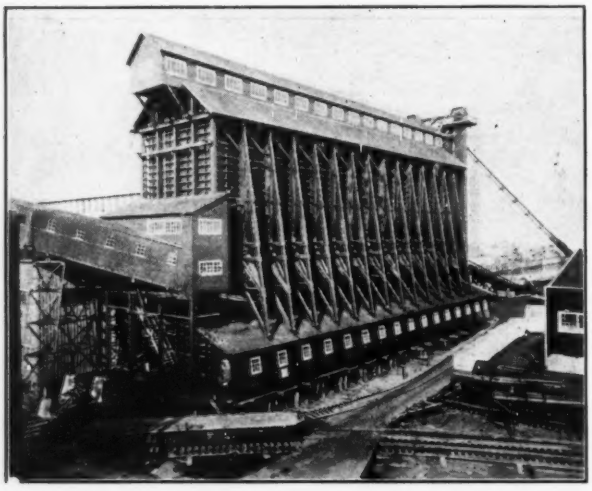
Equipment exhibiting a number of features is used for refining the pulp, or that part of the process between digesters and bleachery. Several blow-pits, situated between the digester and screen buildings, have wood vomit stacks. Perforated Allegheney metal drainer bottoms are supplied by the Nortmann-Duffke Company, of Milwaukee. All refining is carried out on a total of 56 flat screens, manufactured by the Appleton Machine Company, of Appleton, Wis.

Two-Stage Bleaching System

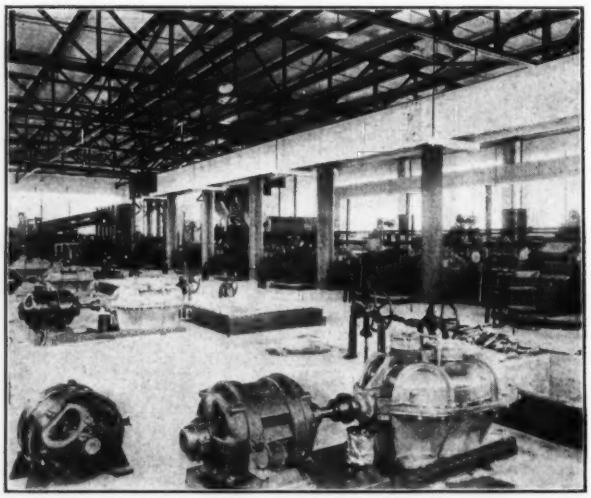
The Pulp Bleaching Corporation, of New York, installed the two-stage bleaching system, which differs from other Pacific Coast installations made by this company in that the first stage is accomplished at low consistency and the second stage at high consistency. Another first Pacific Coast installation is found in the Wolf-Hill washers installed in the mill. The ultimate capacity of the bleach plant is 180 tons of pulp per day. After final bleaching the pulp is run over long felt ripplers, thickened and pumped to the blending tanks ahead of the Minton drier.

Built in Worcester, Mass., in five months, and erected at Port Angeles in 35 days, the fourdrinier wet end and Minton vacuum drier stand as a remarkable record for speed in production and delivery. It has a capacity of 175 tons of 106 per cent air-dry pulp per day. It embodies the largest capacity Minton vacuum drier ever built, with forty 60-inch driers, running in a vacuum of 28 inches. The Rice, Barton & Fales fourdrinier wet end has suction couch roll and three press rolls-one suction. Westinghouse-Nuttall combination of motors and reducing gears are used on the first, second and third presses on the wet end. A Nash-Hytor vacuum pump, turned by a General Electric 100 h.p. motor, provides vacuum on the couch roll. A Jennings flat box pump driven by a 60 h.p. General Electric motor is used to exhaust the flat boxes.

Two Southwark Foundry and Machine Company's presses are used for baling the pulp. The pulp is cut into sheets, weighed



CHIP STORAGE BUILDING



LOOKING ACROSS THE BLEACH PLANT

into bundles of 450 pounds, wrapped and pressed into bundles well within the minimum. The two presses have a rated capacity of 450 tons each and can bale 25 tons of pulp per hour each. Advantages of the Southwark press are that only one valve needs to be opened to start the press and that the high and low stages operate automatically.

The machinery installations also include ten 48 x 120 inch Cypress deckers, one 36 x 60 inch Cypress decker, one 48 x 44 inch high speed Cypress tub beater, seven-unit pulp washer, and three Valley-Voith screw presses, installed by the Valley Iron Works, Appleton, Wis.

Boiler Plant Installation

Installed in the boiler plant are three Sterling type boilers, each having an effective heating surface of 14,140 square feet, 450 pound pressure, equipped superheaters designed to superheat steam to a total temperature of 660 degrees Fahrenheit. Hogged hemlock waste, which is the principal fuel, is fired under the boilers both front and back. The Dutch ovens are of the flat grate type and are divided into three separate furnaces on each side, or a total of six to each boiler.

Electric power is generated in two General Electric turbine-generator units. The turbines are 4,000 KW, double extraction, and the generators 5,000 KW, 2,200 volts. Steam is delivered to the turbine at 420 pound pressure and is extracted at 150 pounds for use in the saw mill and digesters, and also at 20 pounds for drying the pulp on the Minton vacuum drier. Botfield's Adamant fire brick cement, mixed in the proper proportion with Adachrome Fines, was used for laying up the fire brick.

Construction of the water line was completed a little under the year. California Filters Company designed and executed the installation of equipment of the complete filter plant under the direction of the pulp mill engineers. The plant is almost entirely automatic in operation and has been designed to require minimum maintenance. The normal rated capacity is 20,000,000 gallons daily.

Marathon Mills Make Improvements

The Ashland mill of the Marathon Paper Mills Company, Ashland, Wis., which manufactures paper napkins, table covers and similar products for the Menasha Products Company, sales division of the organization has made outstanding improvements during the past year, chief of which are the new water filtration system, converting building and office building.

Water Filtration

The new water system has entirely eliminated the possibilities of shut-down due to the riley water frequency caused by storms on Lake Superior, which the mills border. The settling basin of this new system is 128 feet by 32 feet and has a capacity of a half millon gallons. The water, when pumped from the lake into this basin, is allowed to settle for four hours after which it is filtered. Filtering is accomplished by three sand filters each with a capacity of one-half million gallons per day. After being filtered the water is stored in a clear well 13 feet by 56 feet. One and a half million gallons of water are filtered each day by this system, but its capacity is much greater.

SHOWING IMPROVEMENTS AT MENASHA

SHOWING IMPROVEMENTS AT ASHLAND

An additional finishing room, 100 feet by 120 feet, with full basement and 24,000 square feet of floor space, has been built. The building, of brick, steel and concrete construction is light, airy, and modern in every respect. It is equipped with an electric elevator and conveyor system to handle the finished products both on the floor and in the basement.

A new office building, 30 feet by 54 feet adds greatly to the appearance of the plant. The offices are beautifully finished in walnut and are equipped with files and furniture to match.

New Equipment

A special compact fold embossing and folding machine, a quarterfold embosser and folding machine with a four color printing press, and a table cloth embossing machine with printing press have been added to the converting equipment.

No. 1 paper machine has been equipped with a variable speed steam engine and both paper machines proper are now steam driven with variable speed engines.

Other new additions are: boiler house, building for housing No. 1 steam engine, pump house, warehouse, machine shop, finishing office, sample room and store room. Concrete floor in many instances replaced wood floors.

The Menasha mills of the Marathon Paper Mills Company, at Menasha, Wis., which manufacture merchandise sold through the Menasha Products Division, show very extensive improvements in the form of a new carton plant. The manufacture of cartons, both dry and paraffined had reached such tremendous proportions that various old quarters in which the different operations had been scattered were very much outgrown.

In a new three-story plant, 120 by 300 feet, all carton making activity has been concentrated, with the old buildings turned into warehouse space. The new quarters of brick, steel and concrete represent the most modern developments in industrial architecture, with extensive areas of roof and wall space being devoted to windows so as to enjoy fully the advantages of daylight. Here are installed batteries of presses, cutters and creasers, wax dippers, carton paraffiners, carton gluers, trimmers, etc. There is also a complete job press department as well as finishing rooms. Menasha makes all its own electrotypes and a large and complete electrotype foundry is housed in the new building. Every machine is arranged according to the best production methods with regard to every other machine, giving a production capacity of well over two million cartons per day with the present equipment. Available space makes possible an even greater production through additional machine installation. A conveying system reaches every part of the plant.

New Dalhousie Plant Is Model of Efficiency

Designed for Four Machines, International's Big New Brunswick Mill Began Operations Last Spring With Two Units—Third and Fourth Machines Ready Shortly, When Total Capacity Will Reach 450 Tons of News Print Daily

NEW Brunswick International Paper Company's Dalhousie Mill went into operation in the Spring of 1930 as a result of plans inaugurated more than four years ago, when negotiations leading to the development of the power resources at Grand Falls were completed, and it was decided to build a news print mill in the Restigouche section. Here, the timber and power would be brought together at some point where advantage could be taken of shipment of product, as well as receipt of raw materials, by water.

After a thorough study of several possible locations, the Dalhousie site at the mouth of the Restigouche River was selected. Accessibility to the wood supply and the fact that, of all the places considered, Dalhousie has the longest season for navigation, were the determining factors. After the site was finally selected, it was decided to construct buildings for four machines, first installing equipment for two machines, the design of the buildings to be such as to allow for expansion beyond four machines if possible. The third and fourth machines will start operation in the near future, when the capacity of the mill will be increased from about 225 to 450 tons daily.

New Brunswick International Paper Company was formed to handle the work of constructing the paper mill, and in the spring of 1927, began to assemble the necessary properties for the mill site. Arrangements were made for use of the Government dock, as well as the dock of the Dalhousie Lumber Company. Preliminary surveys and work were commenced in the summer of the same year.

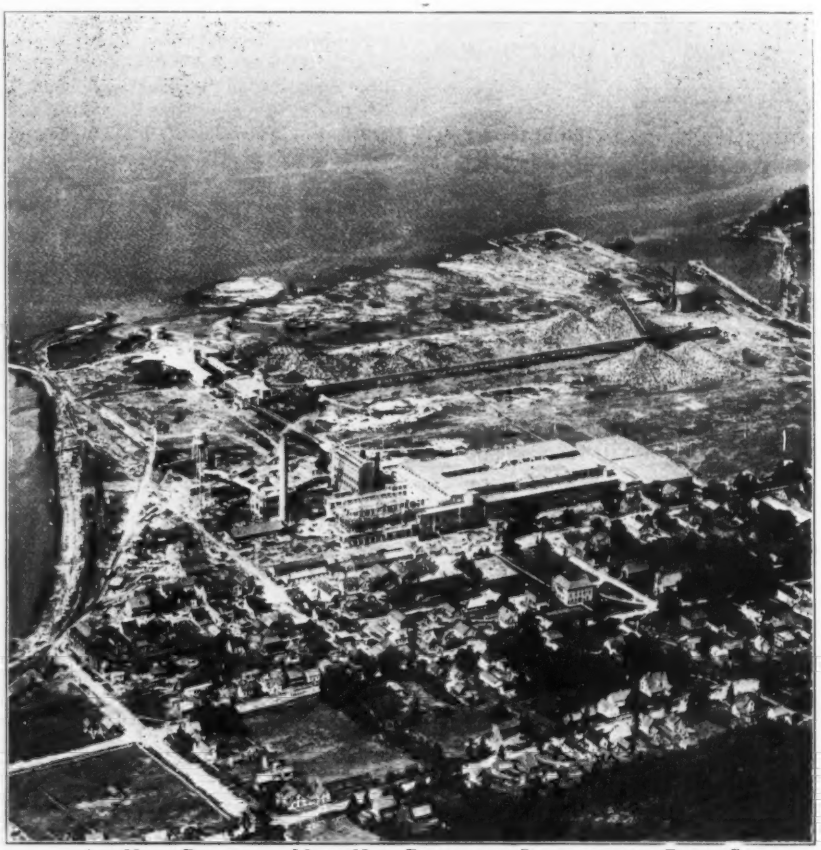
In April, 1928, an order for two news machines was given to the Dominion Engineering Works, Ltd., of Montreal, these machines to be 226 inches wide and to run at speeds up to 1200 feet per minute. On August 16 of the same year, the general contract for building the mill was given to the Domill Construction Company of Canada, Ltd., located in Montreal. Soon after, ground was broken and actual construction was started, being continued through the winter in spite of the many obstacles encountered due to water, snow and ice.

Domill Construction Company sublet parts of the work to other Canadian firms; Canadian Vickers, Ltd., of Montreal, the steel work, and John E. Russell, of Toronto, the dredging, being the two principal sub-contractors. The electrical installation was taken care of by the New Brunswick International Paper Company's own staff.

In February, 1929, the Foundation Company of Canada, Ltd., of Montreal was awarded the contract for building the dam on the Charlo River which furnishes the mill supply of fresh water. This company was also given the contract for digging the tunnels for the pipe line. In March, an order was placed with the Pacific Coast Pipe Company, Ltd., of Vancouver, B. C., for furnishing and installing the wood stave pipe from the dam to the mill, this pipe line being approximately 8½ miles long. In June the Foundation Company was given the contract for grading and preparing the pipe line right of way.

Equipment Installed

The general contract for installing equipment was also given to Domill Construction Company, the award being made in April, 1929. This work started in earnest during August, with the arrival of the first shipment of the paper machines and machine room equipment. Work progressed rapidly in all departments. During the summer and early fall, the number of workmen employed on construction work varied from 350 to 1000. In November, about 1200 men were employed on this work and in addition around 400 on the dam and pipe line. During July and August, the number of employees working on the pipe line varied from 500 to 600.



AIR VIEW DALHOUSIE MILL, NEW BRUNSWICK INTERNATIONAL PAPER CO.

In approximately sixteen months after the contract for building the mill was signed, the first paper machine was being turned over, preparatory to starting on actual production of news print. Where the larg-

VIEW IN MACHINE ROOM OF NEW BRUNSWICK INTERNATIONAL PAPER CO., DALHOUSIE, N. B.

est news print mill of the Maritime Provinces is now situated, there was originally a tide water flat on the Bay Chaleur. The first task in construction, therefore, was to build a sea wall, drain the mill area and then excavate down to bed rock for foundations.

The foundation features of Dalhousie Mill were wholly different from those of other Canadian mills located on tide water. The usual procedure is to drive concrete piles for building supports, but the underlying strata of the Dalhousie site furnished bed rock after excavating from five to ten feet. The foundations were therefore constructed of heavy concrete piers to rock with connecting walls, which support the superstructure.

Steel Freely Used

The superstructure is of heavy steel frame construction, consisting of steel wall columns and beams, supporting in most of the buildings plain 12-inch brick curtain walls. The walls which will be removed on future expansion of buildings are constructed of eight-inch hollow tile. Floors in most of the buildings are of heavy concrete arched type. Creosote wood block finish is used in the machine shop. The office space and finishing room are finished with wood top flooring.

The roofs in most of the buildings are made up of laminated 2 inchs by 4 inches Pacific coast red wood, supported on steel beam and truss construction. A few of the roof decks are made up of gunite concrete, as required by the Fire Underwriters' specifications.

All the mill buildings are built with the idea in mind of low annual maintenance and operating cost. The buildings as a group are designed compactly, still affording an efficient layout and plenty of room in which to operate economically.

Construction Materials

A few statistics on the construction materials afford an idea of the magnitude of the job. To bring the interior of mill buildings up to grade after installing foundations, 100,000 cubic yards of fill were used. In the mill yard, 750,000 cubic yards of fill were used. All of this fill was taken from the dredging operations in the bay adjacent to the mill site. A total of 74,000 cubic yards of earth and 1900 cubic yards of rock were excavated.

In the group of mill buildings, 33,000 cubic yards of concrete were poured in 800,000 square feet of formwork. The cement was furnished by the Canada Cement Company, of Montreal. Structural steel, furnished by Canadian Vickers, Ltd., to the extent of 4500 tons, was used in erecting the framework, and 5,300,000 brick, furnished by the Nova Scotia Clay Works, were laid to enclose the various buildings. The area of roof decks is approximately 246,000 square feet.

At the north of the mill site is located the Wood Preparing Department. Here the 16-foot logs are floated down through the booms and are carried up to the slasher mill by means of four parallel strands of chain supported on a steel frame deck and known as a log haul. The logs are fed through a four-saw slasher and finally drop as four-foot logs into a conveyor, which carries them to the barking drum. All of this wood preparing machinery was furnished by the Canadian Ingersoll-Rand Company, Ltd., of Montreal.

The Barking Drums

The barking drum building is equipped with three 10 feet diameter by 30 foot long "Branch" barking drums furnished by The Waterous Engineering Works, of Brantford, Ont., and will eventually house six drums. In these revolving drums, the bark is removed from the four-foot blocks, which are then conveyed to the storage piles for use during the winter season, or conveyed to the switching tower in the yard, where they are distributed to the chipper building and grinder building.

In the chipper building, the blocks are cut up into chips, which are the raw material for making sulphite pulp. The chips are passed through chip screens furnished by Canadian Ingersoll-Rand Company, Ltd. The accepted chips are elevated to the chip bins which are located over the digesters. In the digesters, which are huge, upright, cylindrical steel shells, the chips are cooked by means of steam and acid liquor into sulphite pulp. The four digesters installed in the mill were furnished by the Horton Steel Works, of Bridgeport, Ont.

The Pulp Grinders

News print stock is made up in the proportion of approximately 25 per cent sulphite pulp and 75 per cent ground wood pulp, so that the larger portion of wood blocks are conveyed to the grinder building. In this building are located 12 magazine hydraulic type grinders furnished by the Waterous Engineering Works, Ltd. Between each two grinders and directly connected to them is located a 2400 h.p. 225 R.P.M

motor. The six motors were furnished by the Canadian General Electric Company, Ltd. From the grinders, the pulp passes by means of canals to the bull screens, where the initial screening process takes place for the removal of knots, sheeves, and coarse materials. The three bull screens were furnished by the Fort Arthur Shipbuilding Corporation.

The ground wood and sulphite pulp is pumped to the screen building where it is screened and refined to the right proportion and then pumped to the paper machine building. The largest part of the screen room machinery was furnished by Canadian companies. The sulphite knotters were furnished by the Sherbrooke Machinery Company, and the ground wood deckers by the Hydraulic Machinery Company of Montreal. Most of the pumps used throughout the mill were installed by Canadian Ingersoll-Rand Company, Ltd.

The Paper Machines

The pulp stock then goes to the paper machine room, where it is transformed from pulp into finished news print. The complete process requires expensive machinery, electric power, steam and trained men. The two paper machines which began the manufacture of paper last spring were furnished by the Dominion Engineering Works, Ltd., of Montreal, and are 226 inches wide, capable of operating at a speed of 1200 feet per minute. The fourdrinier wire is 80 feet long and is driven by a Millspaugh suction couch roll. There are two suction presses and one standard third press. The drier section consists of forty-four 60-inch main driers and a 42-inch baby drier.

An eight roll calender stack is used on each machine, and Cameron winders are used to make up the final rolls of news print. The vacuum pumps for the machines were furnished by the Nash Engineering Company, of Montreal. The drives for these paper machines are known as the Harland sectional electric drives and were furnished by the Harland Engineering Company, Ltd., of Montreal.

The steam plant and electric power plant are very essential factors in the process of making paper and a brief description of these departments is in order.

Four Steam Boilers

For the four machine mill, four 1200 boiler h.p. Babcock & Wilcox Sterling type boilers will eventually be installed. The boilers are built for 450 pounds working pressure, steam being generated at about 415 pounds pressure, giving 400 pounds at turbine throttle. They will be fired by the Fuller-Lehigh Pulverized coal system, each boiler requiring three pulverizing units. The forced and induced draft fans used on the boilers were furnished by Sheldons, Ltd., of Ont. The two induced draft fans are direct connected to variable speed motors, each of sufficient capacity to take care of the two initial boilers. A third fan will be added to take care of the two future boilers. The flue gases will discharge into a common duct from which they are drawn by induced draft fans discharging to a chimney 200 feet high and 14 feet in diameter. The coal handling equipment was furnished by Canadian Mead-Morrison Company, of Montreal, and consists of track hopper, coal crusher and system of belt conveyors. A drag scraper system is used for storing 10,000 tons of coal.

Mill Water Supply

The water supply for the mill is conveyed through a 32-inch pipe from a storage dam on the Charlo River. The dam was constructed by the Foundation Company, of Canada, Ltd. The production of paper from four machines will require approximately 12,500,000 gallons per day, and this water is conveyed approximately 8.7 inches through the pipe line. The wood stave pipe, the larger part of pipe used, was furnished by the Pacific Coast Pipe Company of Canada, Ltd. A total of 34,000 feet of the pipe is constructed on precase concrete piers and cast iron saddles; 8200 feet of wood stave pipe is buried and protected with 6-inch concrete cover; 3600 feet is cast iron and buried, and 2555 feet passes through tunnels 11 feet wide by 7 feet, 6 inches high.

All construction equipment and materials were inspected by the Seton Engineering Inspection Company, Ltd., of Montreal. The electrical equipment was inspected by the Allen Engineering Company, Ltd. of Montreal.

Electrical Engineering Features

The new Dalhousie news print mill utilizes electric energy for the machanical power throughout the several processes in the manufacture of paper. The electrical layout has been designed for a four-machine mill.

Most of the power required is supplied from the Grand Falls hydro-electric development of the company on the St. John River. This development has an initial installation of 3—17,500 K.V.A—600 volt vertical generators.

In the Dalhousie boiler house, two turbine generator units operate in parallel with the Grand Falls system. The main non-condensing turbine, using process steam from a throttle pressure of 400 pounds to 125 pounds back pressure exhaust, is direct connected to a 7500 K.V.A.—6600 volt generator.

An emergency standby 125-pound condensing turbine generator unit of 900 K.V.A capacity is designed to increase the steam flow through the 7500 K.V.A turbine in case of transmission or other difficulty with Grand Falls power.

Transmission of Power

At Grand Falls the necessary protective and switching equipment is installed to supply power from the station's 6600 volt bus through two banks of three single phase, oil insulated, water cooled transformers. Each bank has a capacity of 18,000 K.V.A and will step up the primary voltage of 6600 volts for transmission at 132,000 volts.

The 104 mile steel tower transmission line from Grand Falls to Dalhousie is designed for a single 132,000 volt, three-phase circuit, consisting of 477,000 circular mill steel core aluminum cables.

At the receiving end, the line ties into a high tension outdoor sub-station, equipped with two 18,000 K.V.A banks of transformers to step down to 6600 volts for distribution. An unusual feature of the high tension sub-station is that the main 6600 volt sub-station building is used as the foundation for the steel structure, with the line and transformer 132,000 volt oil circuit breakers and lightning arresters mounted on the roof of the building. To insure continuous power during inspection and maintenance, each high tension oil circuit breaker may be isolated and by-passed with air break switches.

6,600 Volt Sub-Station

The secondary of each 18,000 K.V.A bank of transformers is connected to its own isolated 6600 volt bus. By equipping all distribution circuits with double throw disconnects, it is possible to interchange electric load connections between buses. One of the buses will supply the power for a 16,000 K.V.A—6600 volt electric boiler, generating steam at 125 pounds. When the mill is operating four machines, the electric boiler will be disconnected on week days and used for steam generation on Sundays.

An auxiliary or continuous 6600 volt power bus is used for an intermediate connection to parallel the turbine generator units and to supply the preferred feeders before a tie is made to either of the main buses energized by Grand Falls power. The purpose of the auxiliary bus is, by tripping one switch simultaneously with the failure of Grand Falls power, to isolate the boiler house, screen and machine rooms and lighting feeders and to maintain continuous operation of the paper machines with stock from screened stock chests. These feeders are designed to supply the minimum number of motors, required for continuous running of paper machines, from steam generated electric energy. The steam valves of the 7500

K.V.A. set are automatically controlled to give an increased output by exhausting to atmosphere, until the 900 K.V.A emergency set is started.

The 6600 volt oil circuit breakers are enclosed in asbestos transite board cells and are operated by a 250 volt station battery, from a remote control switchboard.

Grinder Motors

The electrical layout has been designed for an ultimate installation of 14 grinder motors. Each 2400 h.p., 6600 volt, 225 r.p.m. motor is mounted between and direct connected to two grinders. The synchronous motors are constructed for self starting at a reduced voltage and connected with oil breakers to the starting and running buses. The sub-station operator has full control of the starting and stopping of the motor and a signal station at each motor relays from the grinder operation to the control room the operator desired.

Lightning Distribution

The power for low voltage motors is distributed at 6600 volts to fireproof transformer vaults located at eight load centers, where it is transformed down to 550 volts. The power for lighting is distributed at 6600 volts from the continuous power bus to load centers where it is transformed for three wire 100 volt service.

Paper Machine Drive

Each paper machine at the Dalhousie Mill is equipped with a complete Harland drive. For supplying the necessary direct current power to the section motors, there is provided for each paper machine, one 1,000 b.h.p. steam turbine, operating on 125 pound throttle pressure against a back pressure of 10 pounds gauge, connected through a double helical reduction gear unit to one 600 k.w. 530 volt d.c. generator and one 30 k.w.-250 volt exciter. A starting motor generator set, consisting of a 300 h.p.-900 r.p.m. synchronous motor direct connected to a 200 k. 3-230 volt d.c. generator, has sufficient capacity for starting and crawling the various sections of the machine.

The drier section is driven in groups of six driers through drive in shafts connected to eight 45 h.p. motors and uses the drier felt for a mechanical tie between groups. The master speed control shaft is driven by gear drive at two points from the drier section. The six controlled sections, namely, couch, three presses, calender and reel, have their own individual starting panel of full automatic type operated by lever controllers from the front side of the paper machines.

Shipping Facilities

One of the reasons for locating New Brunswick International Paper Company's mill at Dalhousie was to take advantage of water shipments. Dalhousie is situated on Bay Chaleur, at the mouth of the Restigouche River, which is an open port during an average season of approximately 270 days per year. The harbor opens about April 20 and closes about January 1. The water in the Bay is deep enough to accomodate the largest boats which are used to ship paper to both American and foreign markets.

There are two docks, one at each end of the mill site. The raw materials come in at one dock and the finished product is shipped from the other at the finishing end of the mill. The docks at Dalhousie are built to accommodate ships with a maximum draft of 28 feet at low tide. The berths at the shipping dock accommodate a ship of approximately 450 feet in length.

Large Cargoes Loaded

This draft and length of dock meets the requirements of ships to carry from 6000 to 6500 tons of paper cargoes. Transportation facilities from the mill to this dock is arranged to handle approximately 100 tons of paper per hour and the transporting machinery is so installed that by increasing the speed the capacity will be increased if found necessary to load paper on the boats at a faster rate.

A large amount of raw materials such as coal, sulphur, lime rock, etc., is received by boat at the receiving dock from which it is transported to the mill by means of conveyors and placed in its proper storage areas.

Railroad Facilities

In order to have adequate facilities for the receipt and shipment of products by rail, a sufficient number of sidings which total approximately 10,000 feet have been installed in the mill yard. These sidings accommodate from 75 to 100 cars when necessary.

During the period of the year when the harbor is closed, it is necessary to take care of approximately 250 incoming cars per month loaded with raw materials and facilities have to be provided for loading and shipping approximately 550 cars of paper each month; these figures are based on the full installation of four machines.

The platform for loading paper on to cars is about 185 feet long and has a double siding to accommodate 8 cars. For loading paper into cars from paper storage overhead cranes are arranged to place the paper on the loading platform where it is picked up by electric trucks and loaded into the cars. When the paper is shipped as fast as made, there is a system of conveyors in the finishing room that brings the rolls out to the shipping platform where the electric trucks serve the same function as mentioned before. These conveyors, cranes and electric trucks are designed to load from 20 to 25 cars per day without seriously taxing their capacity.

Coal Handled Direct

Facilities for handling coal are such that the cars discharge directly into outdoor storage or into conveyors leading to the coal crusher house, from there it is carried by conveyors to the bunkers in the boiler plant.

One trestle is used for unloading sulphur and lime rock. The cars of lime rock are set on the trestle and the contents emptied on to the storage piles underneath. The cars of sulphur are run on to the trestle and placed over a hopper into which the sulphur discharges. From there it is carried by a conveyor to a storage tank having a capacity of approximately 3800 tons.

From this description it can be readily seen that this mill is designed for taking maximum advantage of both water and rail facilities for receipt and shipment of materials.

Personnel of Dalhousie News Print Mill

George D. Bearce, manager of Dalhousie Mill for New Brunswick International Paper Company, is one of the best known men in the pulp and paper industry, coming to the International organization from the News Print Service Bureau, where he was engineer specializing in standardization of costs and operating efficiency. For some time he was assistant to the manager of manufacturing for International, leaving that position to become manager of Dalhousie Mill.

Mr. Bearce was educated at the University of Maine, Columbia University and the Walton School of Commerce. For several years he worked on paper machines and in mechanical departments for various manufacturers, including International Paper Company. Before going to the News Print Service Bureau, he was with Mead Pulp and Paper Company, in Chillicothe, Ohio, in charge of raw products and assistant to the manager.

Technical organizations of which Mr. Bearce is a member include the American Society of Mechanical Engineers, where he is chairman of the Committee on Pulp and Paper in the Printing Industries Division; Technical section of the Canadian Pulp Association. In the latter organization Mr. Bearce

was for two years chairman of the Committee on Waste Products, where considerable progress in reduction of waste in the paper industry was effected.

Associated with Mr. Bearce in the operation of Dalhousie Mill is an able and experienced group of paper men. Among them are the following: Lee J. LaBarge, paper mill superintendent, was with the Racquette River Paper Company, Potsdam, New York, for nine years. He came to Canada in 1910, with Spanish River Pulp and Paper Company. Later he was with Price Brothers, boss machine tender with Abitibi Pulp and Paper Company for five years, and E. B. Eddy Company. When International's Gatineau mill began operations, Mr. LeBarge was assistant paper mill superintendent, from this position coming to Dalhousie Mill.

T. C. Creaghan, resident engineer, was born in Newcastle, New Brunswick, and attended Harkin's Academy, Prince of Wales College and McGill University. He was overseas with the Canadian Expeditionary Force as engineer and with the Royal Flying Force, ranking as Captain. Before entering the International organization, Mr. Creaghan was with Donnaçonna Paper Company as assistant mechanical superintendent, and with Anglo-Canadian Pulp and Paper Company's engineer and purchasing agent.

D. M. Pineo, superintendent of the electrical department, was born in Canada, and has had a long experience in the electrical field. Among other organizations with which he has been associated are the Westinghouse Company, Fuller Construction Company, Stone and Webster, Ludlum Steel Company and the Newfoundland Power and Paper Company.

Raymond G. Edwards, superintendent of steam and power at Dalhousie, is a native of Saskatchewan. Prior to his association with International, he was with Backus Brothers, Consolidated Water Power and Paper Company and Abitibi Power and Paper Company.

C. D. Otty, superintendent of the sulphite mill, was born in Hampden, New Brunswick, and was educated at the University of New Brunswick. He has been associated with Brompton Power and Paper Company, Dryden Paper Company, Oxford Paper Company, St. Lawrence Paper Company, Nashwalk Paper Company, Newfoundland Power and Paper Company and, before coming to Dalhousie, was at the Otis, New York, mill of International Paper Company.

Lyle L. Davis, superintendent of the finishing department at Dalhousie Mill, is a native of the Province of Quebec. Before coming to New Brunswick International Paper Company he was with Brompton Pulp and Paper Company.

John Elder, mechanical superintendent, was born in Edinburgh, Scotland, and was educated at the Edinburgh High School. His previous associations include Carron Grove, Scotland; Rishton, England, and Horton Kirby, England; Dominion Power and Paper Company, and Lake St. John Pulp and Paper Company in Canada.

Leonard W. Hutchings, superintendent of the ground wood department, was born in New Brunswick. He has been associated with Price Brothers, Anglo-Newfoundland Company, Abitibi, and Bathurst Pulp and Paper Company.

A. W. Simpson, who has been general superintendent at the Corner Brook Mill of International Power and Paper Company at Newfoundland, comes to Dalhousie with a wide background of experience in the paper industry. Previous to his associations with International, he was with Racquette Paper Company, Remington Mills, Niagara Mills and the DeGrasse Paper Company.

Lancaster Storage Tanks Widely Used

Wherever used Lancaster Tanks and Steel Plate Products have established their own reputation. Manufactured by the Lancaster Iron Works, Inc., of Lancaster, Pa., Lancaster Storage Tanks can be furnished of any kind of steel generally used, but are usually supplied to a definite specification of the American Society of Testing Materials Specifications.

Tank steel was for years known as the proper steel to be used in ordinary tank manufacture. While it is still used to a great extent Lancaster Iron Works long ago discarded Tank Steel, which is without definite specifications, as unworthy and entirely too uncertain in physical and chemical qualities.

Flange or Boiler Steel and also Firebox Steel are classes of steel usually specified in Boilers and Pressure Vessels, or Tanks subjected to high pressures. The A. S. M. E. Code and also many State and Insurance Regulations specify these grades. Still Bottom and Locomotive Firebox Steels are specified where plates are not only subjected to pressure but also to direct heat.

Class "A" Steels, as they are becoming generally known, are steel plates rolled to A. S. T. M. specifications, these specifications having been revised in 1929 by the American Society for Testing Materials, as follows: Structural Steel for Bridges A7-29 and Structural Steel for Buildings A9-29. There are only slight differences in the analysis and structure of these two specifications and both have been found to work out satisfactorily in the manufacture of tanks to the highest degree.

So far as strength is concerned the Tensile Strength is from 55,000 lbs. per square inch and the Class "A" Steels resemble Flange or Boiler Steel so closely that there is no appreciable differences. There is no increase in the cost of Class "A" steels over steels with indefinite specifications and as they are superior in so many ways, the Lancaster Iron Works early saw the special advantages to be obtained and has been manufacturing Class "A" Lancaster Tanks for some years.

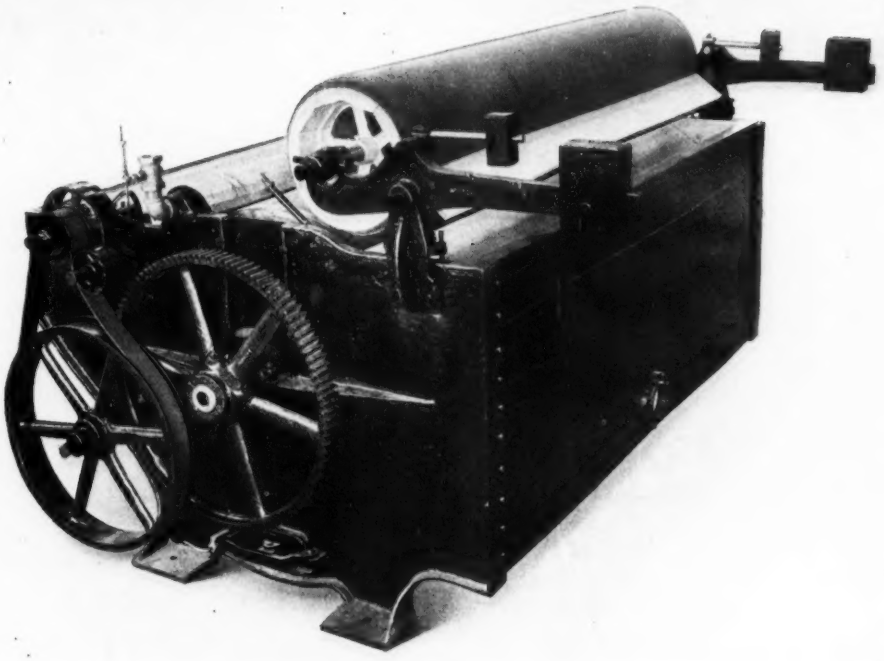
Practically all of the large railroads of the United States have adopted Copper Bearing Steel in their specifications for coal cars and tanks and have found by tests conducted by themselves that the life of steel is increased by more than 50 per cent. Lancaster Iron Works have been pioneers in recommending and manufacturing copper bearing steel tanks, stacks and pipe. The first cost of tanks is only slightly increased by using copper bearing steel, but as the life is so much greater it is far cheaper in the long run. Copper in steel increases its ductility, retards corrosion and insures long wear.

Where tanks up to 72 inches in diameter are elevated on concrete piers it is recommended that the piers be at least 12 inches wide and long enough so that the tank will have a bearing surface of at least one-third of its circumference. Over 72 inches the piers should be from 15 to 18 inches thick. If possible, there should be one pier to each course, with not more than 8 feet centers, and the piers should be so arranged that they come near the ends of the tank, and so spaced that they do not cover the girth seams. Where tanks are buried underground, provision should be made for draining the pit, so that water will not collect and float the tank when empty, thus breaking pipe connections.

All tanks up to and including 48 inches in diameter have one head backed in and no manhole unless specially ordered. All tanks 60 inches in diameter and larger have both heads convex, and a standard of 11 inches x 15 inches boiler manhole in one head. The working capacity of a pressure tank is about two-thirds of its rated capacity. All pressure tanks are tested to a point of 25 per cent above the desired working pressure.

All tanks have single riveted girth seams, longitudial seams are single, double or triple riveted, except where extra high working pressure is used and then special riveting is used as required. Button head steel boiler rivets are used.

All the heads are dished to a spherical radius equal to the diameter of the tank and make a wonderful appearance. They have been dished by the spinning method as against being pressed.



RECOVER YOUR STOCK WITHOUT SLIME OR LUMPS

The Bird Save-All gets virtually all the fibre from your white water . . . and delivers it in perfect condition for paper making. Let us show you why the Bird Save-All can cause no slime, why lumps cannot form.

BIRD MACHINERY

BIRD CLOSED SYSTEM

BIRD MACHINE COMPANY
SOUTH WALPOLE
MASSACHUSETTS

4472

DOWNINGTON
KILBERRY PATENT
SUCTION ROLL
Downingtown Mfg. Co.
Downingtown, Penna.
U. S. A.

No Draw Roll Necessary

This illustration shows a recent installation of our 36" suction couch roll of the cantilever type, with the suction piping in back of the machine and a complete first press with 30" suction roll. All adjustments on both of these Downingtown Suction Rolls can be made from the front side while running. On the first run of these rolls, salable paper was made in less than five minutes after stock was turned on the wire, and the machine ran for over 12 hours without a break. These rolls increased the speed and production of the machine over 20% and reduced the dryer steam pressure 33%. The quality has also been improved, due to uniform drying all across the sheet.

New Fir-Tex Board Mill Starts Operations

Modern Plant At St. Helens, Ore., Which Was Formally Opened Recently, Has Specially Designed Fourdrinier Machine With Capacity of 15,000 Square Feet Daily—Plans Considered For Expansion Which May Develop Into Eight Units

EMBODYING entirely new ideas in the manufacture of insulating board, the new plant of the Fir-Tex Insulating Board Company, at St. Helens, Ore., which was formally opened on August 5, is attracting much attention from structural and manufacturing experts the country over. The Fir-Tex plant is the last word in modern construction suitable for the purpose to which it was designed, including in its building materials, steel, brick, tile and fire-proof sash.

It is built to operate on a straight line of production from the water end of the dock where chips are unloaded from barges to the finishing room where the product is either stored after completion or loaded on cars that are run into the building to a depressed track for shipment immediately. The dock is a quarter of a mile long and the main building unit, which includes everything except the boiler house and laboratory, is also a quarter of a mile, making half a mile of continuous buildings to house the processes.

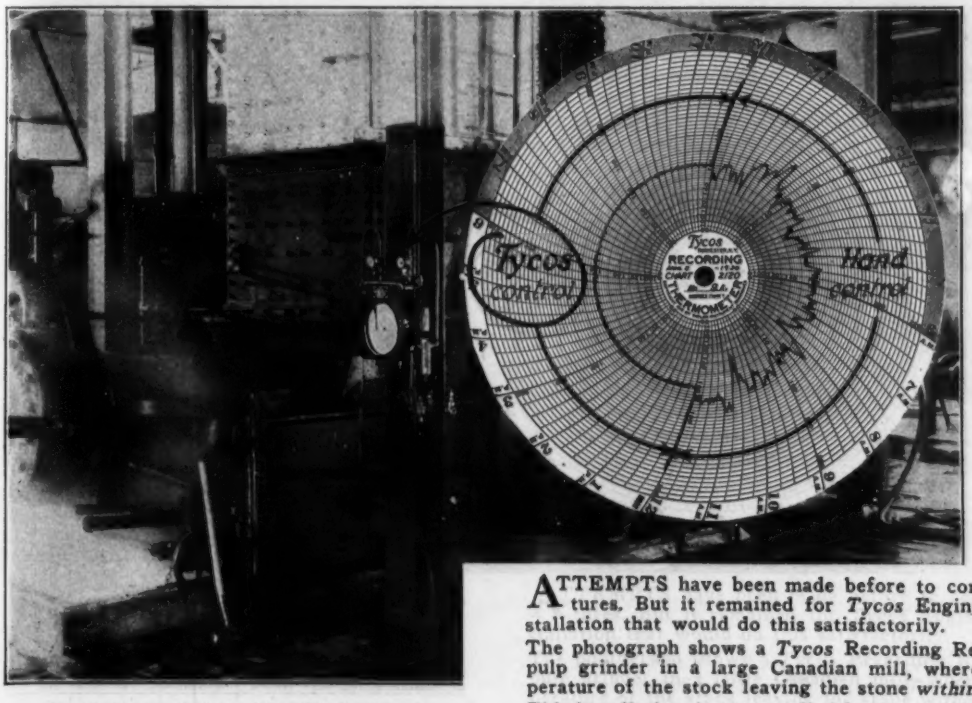
The chips from Columbia River saw mills are taken from the barges and carried to the digester building storage, where the chips are processed in six 18-foot Biggs rotary boilers, the fiber being run through hammer shredders and run into storage chests ready to run over the Fourdrinier which has a wire 13 feet wide and 100 feet long and turns out a board 12 feet wide, of one inch thickness, semi-laminated, super-rigid insulating material.

Fourdrinier Installed by Beloit

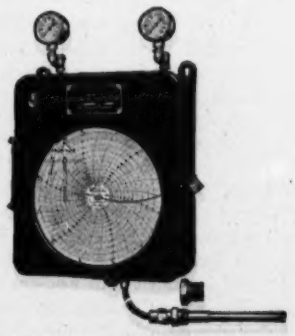
The Beloit Iron Works of Beloit, Wis., built and installed the Fourdrinier board machine. The unit consists of three main press sections and five primary sections with two rolls to each press. The rolls in the main press weigh about 12 tons each.

AERIAL VIEW OF THE NEW PLANT OF THE FIR-TEX INSULATING BOARD CO., ST. HELENS, ORE.

Now—*Positive Grinding Temperature Control...*



Actual photograph of the *Tycos* Grinder Control Installation in a large Canadian Mill and chart record taken from this instrument showing both hand and manual control. This installation is an exclusive development of the Taylor Instrument Companies, on which a patent has been applied for.



The *Tycos* Recording Temperature Regulator, which is set by the turn of a key and controls to 1° variation, giving a continuous record of grinding temperatures.

ATTEMPTS have been made before to control grinding temperatures. But it remained for *Tycos* Engineers to perfect an installation that would do this satisfactorily.

The photograph shows a *Tycos* Recording Regulator installed on a pulp grinder in a large Canadian mill, where it controls the temperature of the stock leaving the stone *within one degree variation.*

This installation (patent applied for) places the regulator bulb *where it belongs* . . . where it can record and control *accurately* . . . yet is protected from damage and in no way hampers the operation of the grinder.

Mill operators will recognize this as the most important control development for paper stock in many years. The temperature of the ground pulp and the stone are closely controlled and a uniformity of stock hitherto impossible is easily and consistently obtained.

Uniformity of temperature means uniform texture, freeness, strength, and general high quality stock. Lifeless, flour pulp and coarse, chunky stock caused by grinding at too high and too low temperatures are both prevented.

Uniformity of stock at maximum strength enables the operator to use a greater proportion of the cheaper pulp in the making of news print . . . *a real saving.*

Regulation of the stock and stone temperatures enables the operator to keep the grinding temperature at a point best suited to the condition of the cutting surface of the stone. It eliminates damage to stone caused by quick temperature changes, prevents over-heating and glazing, giving longer life and maximum production at all times.

Saves workmen's time required to watch pulp and manipulate hand valves, *yet does the job infinitely better.*

These are but a few of the advantages of this installation. A request to our Rochester or Toronto office will bring you the whole story . . . a mighty important one to mill operators who are interested in grinder production.

Taylor Instrument Companies

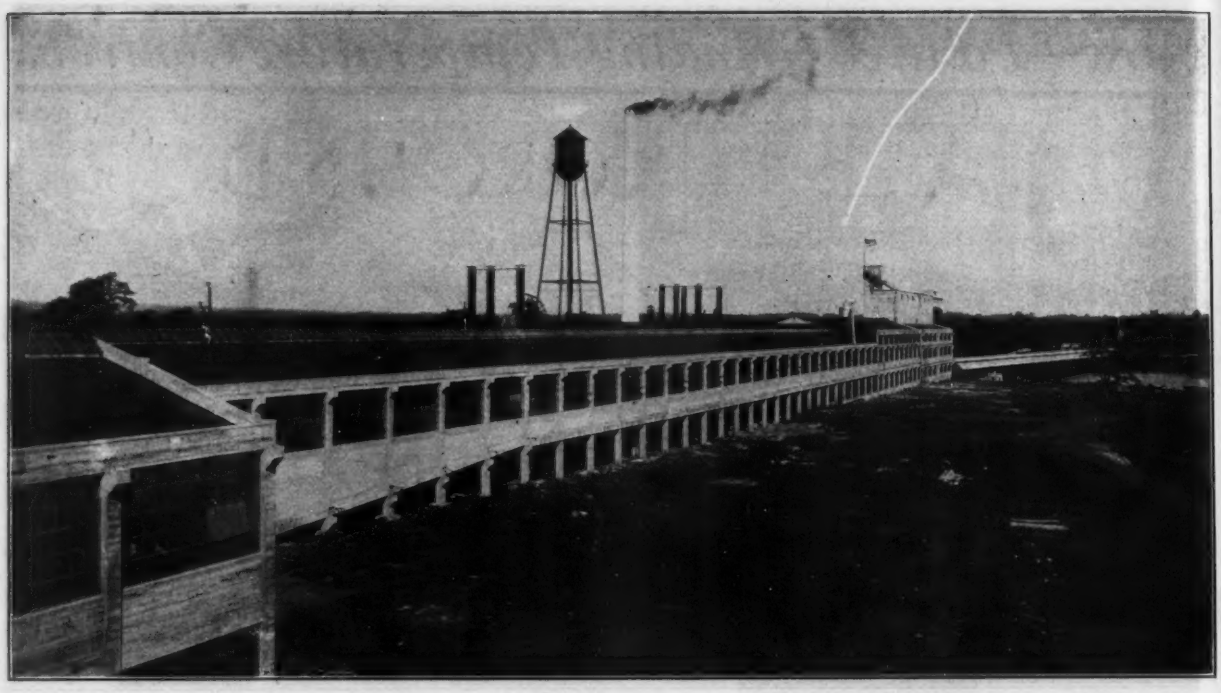
Rochester, N. Y., U. S. A.

CANADIAN PLANT
TYCOS BUILDING
TORONTO

MANUFACTURING DISTRIBUTORS
IN GREAT BRITAIN
SHORT & MASON, LTD., LONDON, E-17

Tycos Temperature Instruments

INDICATING - RECORDING - CONTROLLING



VIEW OF THE PLANT OF FIR-TEX INSULATING BOARD CO. FROM THE SOUTH SIDE

This machine was built especially to meet the needs of the Fir-Tex process and is the only one in existence capable of turning out an insulating board of this thickness.

The boiler plant comprises 500 h.p. boilers and a notable feature is the 250-foot white smokestack which towers as a landmark visible for many miles. The company burns oil for fuel as all the wood material coming to the plant is necessary for production material. A 50,000 gallon steel water tower and two fuel oil tanks are also included in the plant ensemble, the site of which comprises six acres.

Three great retorts supply the heat blasts to the driers through a process of gauged temperatures that permit thorough extraction of moisture. Continental Industrial Engineers, Inc., Chicago, installed the three retorts capable of delivering a normal load of 15,000,000 heat units per hour from each individual furnace. Each is 17 feet high, 29 feet wide and 25 feet long, oil burning, with a capacity of 150 gallons of oil per hour. The heating plant furnishes heat to evaporate 360 tons of water per day.

The driers were installed by the Coe Manufacturing Company of Painesville, Ohio, and are of the continuous roller type, automatically fed, 11 feet high and 15 feet wide, with a capacity running normally of 250,000 feet each 24 hours.

Biggs Boiler Works of Akron, Ohio, installed the six 18-foot diameter spherical digesters under the supervision of Jack Turner. The Jagger-Sroufe Company, of Portland, designed and installed the complete electrical equipment for the plant, employing a large force of highly skilled electricians. An immense amount of high tension wiring was required and the switchboard is an amazingly large yet intricate masterpiece of electrical engineering.

The Bingham Pump Company of Portland installed the battery of large electric pumps required to supply water for the boilers and the plant.

The J. F. Shea Company of Portland, had the general contract on the mill. Other firms of prominence who had part in the project include Jeffrey Manufacturing Company, Griffith Rubber Company, Pacific Blow Pipe Company, Crane Company, Pacific Iron Works, General Electric Company, and National Tank and Pipe Company.

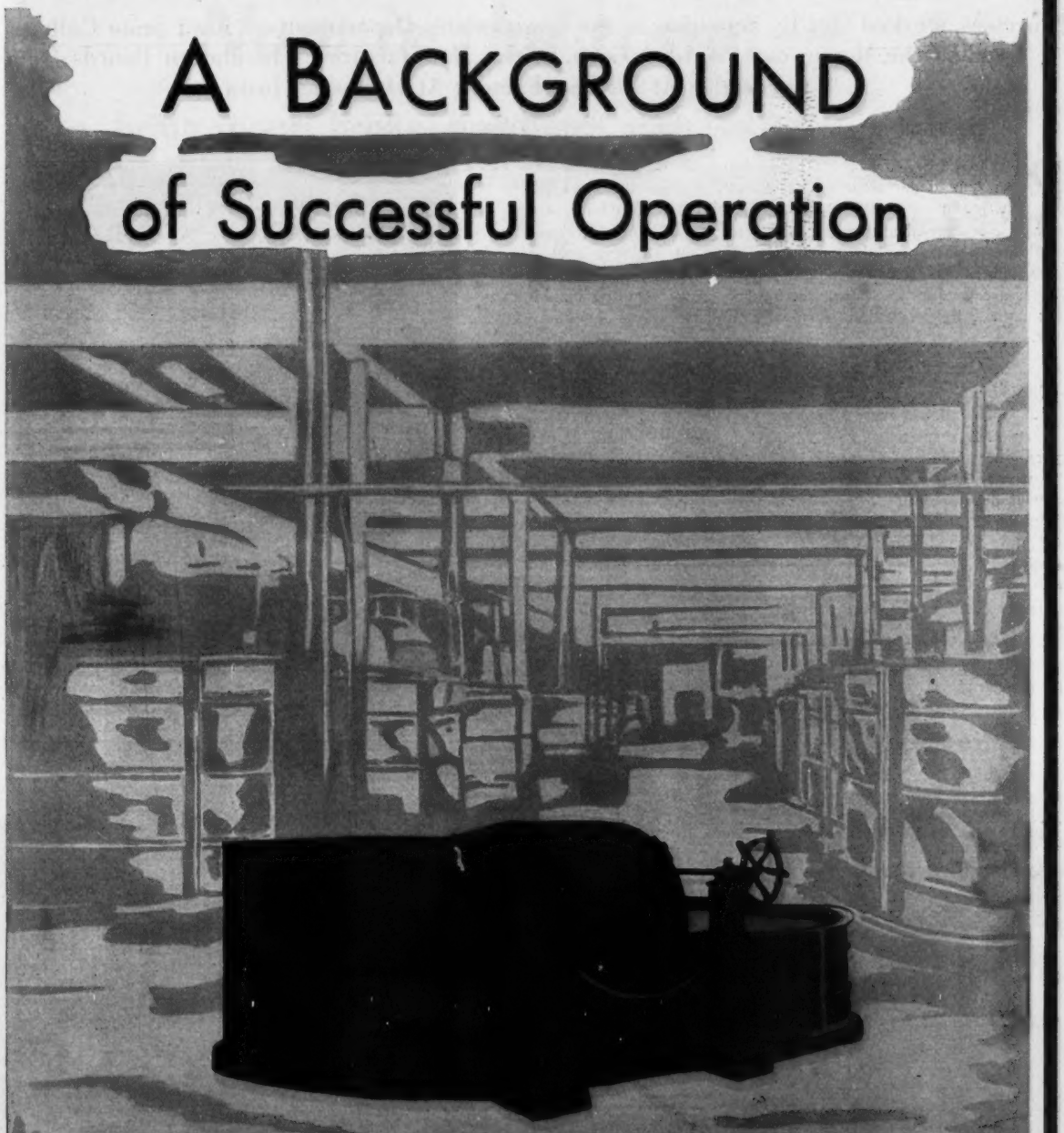
The plant is capable of producing 150,000 square feet of Fir-Tex every 24 hours, which is more than present needs, according to J. H. Burnside, sales manager for the company, but so encouraging does the market for this product appear, that plans are already being considered for expansion which may even develop into eight units that would have a possible capacity of 1,500,000 board feet a day.

New Board Plant at Salem Has Modern Equipment

Western Board Products Company was recently started at Salem, Oregon, and is engaged in the manufacture of specialty boards, such as trunk board, binder board, container board, press board, etc., using as raw material in the by-product of the paper mills and linen mills, viz., pulp screenings and flax chives. This concern will have a capacity of 8 tons per day, running three 8-hour shifts. It is housed in a building 60 feet by 175 feet, single span, with boiler house 40 feet from the main building. The plant is equipped with one three ton digester, two beaters of 1200 pounds capacity each, two 10,000 gallon stuff chests, two 4-ton board machines, two board calenders, one 64-foot Seybold Cutter, and a 65 h.p. bricked in boiler. All machines are equipped with individual motors. Water requirements are adequately taken care of by an 8 inch drilled well, 285 feet deep, with a flow of 150 gallons per minute.

Officers of the company are Jas. G. Heltzel, preisdent, F. Puttaert, vice president and manager, F. D. Thielsen, secretary-treasurer. Henry Puttaert is superintendent. F. Puttaert, manager, was a former resident of Brussels, Belgium, where he operated a mill along similar lines very successfully. A few years ago he came to America, located at San Francisco, where he installed a mill and operated it with some success, though seriously handicapped by inability to obtain raw material. His attention was called to the waste material from the paper and linen mills at Salem, with the result that he organized this company, financed and officered by local men. The superior quality of board manufactured, coupled with the fact that this is the only mill of its kind on the Pacific Coast, insures its successful operation.

A BACKGROUND of Successful Operation



Dilts

MACHINE WORKS Inc. FULTON, N.Y.

"Your Paper Is Made In Your Beaters"

Making Boards From Cornstalks at Dubuque

Processes Worked Out By Scientists in the Engineering Department of Iowa State College Are Used by the Maizewood Products Corp. in the Manufacture of Insulation Boards from Cornstalks At Its New Factory At Dubuque, Iowa

By C. E. Hartford

PROCESSES, worked out by scientists in the chemical engineering department of Iowa State College at Ames for the manufacture of insulating board from cornstalks, are now in commercial use in the factory of the Maizewood Products Corporation at Dubuque, Iowa. The cornstalk product is marketed under the trade name Maizewood. Two general grades are produced—a tough, strong board for building insulation, and a lighter weight board for non-structural insulation uses.

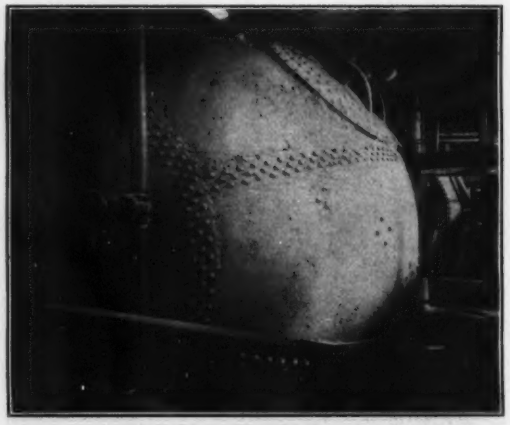
Controlled by National Constalk Processes

The Maizewood Products Corporation is controlled by National Cornstalk Processes Incorporated, the latter organization having taken charge in July, 1929. The Dubuque factory began operations on a commercial scale November 12, 1929.

National Cornstalk Processes Inc., contemplates the commercial development of other processes worked out under the direction of Dr. O. R. Sweeney at Iowa State College for the utilization of agricultural wastes. Out of several projects developed in Dr. Sweeney's laboratory, the manufacture of insulation board from cornstalks was undertaken first because it appeared to be ready for immediate commercial development.

$10 Per Ton Baled and Delivered

A field representative of the company contracted with farmers and operators of balers in Iowa and Illinois for cornstalks during the past season at a price of $10.00 per ton baled and delivered at the factory. This figure gives the farmer about $3.00 per ton after paying the cost of harvesting, baling and shipping. The stalks are broken or cut down after the corn has been harvested, raked together in piles and then baled in bales weighing about seventy pounds and measuring about 36 inches by 16 inches by 18 inches. Shipment of stalks start late in November



GLOBE ROTARY DIGESTER

GENERAL VIEW OF PLANT OF MAIZEWOOD PRODUCTS CORP., DUBUQUE, IA.

Now is the time —

to bring your broke handling and recovery system to highest efficiency through the installation of a

Voith Pulper

Be sure to get an "Original Voith" Pulper with all its valuable features and improvements based on the wide experience gained from building almost 600 such machines.

American Voith Contact Company, Inc.

280 Madison Ave. **New York**

and continue more or less continually through April, with the heaviest shipment coming during November, December and early January.

As the stalks are delivered at the factory as many as are needed for the plant operations are unloaded into the shredder house while the remainder are piled in large ricks. The plan of operation at the Dubuque factory calls for the storage of about 12,000 tons of stalks.

Shredders, Digesters and Washers

In the shredder house the baling wire is removed and the bales broken into chunks six or eight inches thick. These chunks are fed to a belt conveyor which carries them into a swing hammer mill shredder. The shredder reduces the stalks to particles ranging in length from ½ inch or finer to 5 or 6 inches. This material falls onto another belt conveyor which carries it over a magnetic separator and into a centrifugal fan. The magnetic separator removes baling wire and other tramp iron and discharges it into a pit. The fan blows the shredded stalks to any one of four wooden bins located in a line above four globe rotary digesters. The contents of the bins, consisting of about four tons, is discharged into the digesters where the fiber is steam digested at 100 pounds pressure for about two hours. The digester charge is dumped into a pit, the cook liquors drained off, and the pulp pumped to a cylindrical washer.

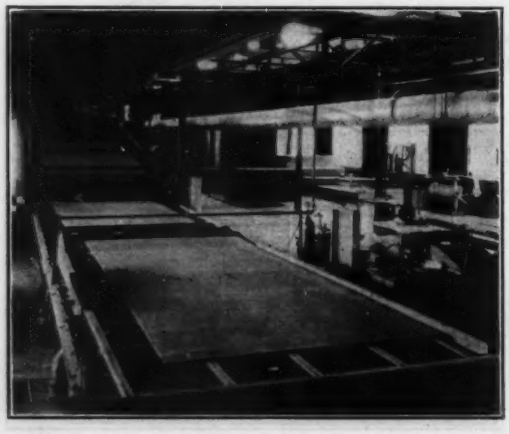
From the washer the pulp passes through a cutting machine which reduces the longer fibers so that the pulp contains no pieces longer than three or four inches. After passing through another washer rosin size is introduced and the pulp passes to a stock chest. From the chest the pulp is pumped through a Claflin and a Jordan. Alum introduced at the Jordan discharge completes the waterproofing process and the stock flows to a chest ahead of the forming machine.

Forming Machine Specially Designed

The forming machine used to manufacture Maizewood was designed specifically for the process of making an insulation board from cornstalks. Its design evolved from years of experimental work in the chemical engineering department at Iowa State College. The machine is capable of forming pulp of a wide range of freeness into boards eight feet wide and of accurate thickness ranging from ¼ inch to 1½ inches. It produces a board consisting of completely interlaced fibers, entirely free from layers and laminations.

Presses, Driers and Cutters

The board leaves the forming machine with a moisture content of 88 percent. A caterpillar type press manufactured by the Kutztown Foundry and Machine Company of Kutztown, Pa., reduces the moisture content to 70 percent before the board goes into the drier. The press consists of a lower belt of 4 inch wide steel platens fastened to a chain which carries them over



DRY END OF THE BOARD MACHINE

RECEIVING CORNSTALKS AT THE MILL

a fixed girder and a similar upper belt of platens which is carried under a girder to which pressure is applied by means of heavy springs.

Both upper and lower platens are covered by an endless belt of wire screen, the lower screen being a continuation of the forming machine screen.

As the board emerges from the press it is automatically cut into any desired length up to 20 feet by a rotary knife cutter. The boards are then automatically fed into an 8 deck Coe continuous roller drier. The drier is heated by steam coils which maintain a temperature of 315 degrees F. The enclosed length of the drier is 168 feet.

From the drier the boards are carried by a conveyor table through a set of circular saws which trim the edges of the board and split it into two 4 feet widths. These boards then pass to a cross conveyor table which carry them through another set of saws where they are cut into lengths ranging from 3 feet to 12 feet.

It is necessary to saw the board a trifle small to allow for the expansion which takes place as the boards containing 3 percent moisture when they come from the drier absorb moisture in coming to equilibrium with the moisture content of the air. The amount which each size board expands on coming to equilibrium has been determined by careful tests and the trim saws are set to allow for this expansion. The board is subjected to a light water spray during the cutting operation to shorten the time required to reach equilibrium.

The finished board is piled on skid platforms which are transported to and from storage by means of lift trucks. All boards are stored until they have thoroughly seasoned, i.e., reached their equilibrium moisture content.

Complete Control Laboratory

A complete control laboratory maintained at the factory tests the boards at regular intervals for weight, moisture absorption, thermal conductivity, transverse breaking strength, and impact strength

Following small scale experimental work at Iowa State College, production has recently started at the Maizewood Products factory of an adhesive from the liquors drained from the pulp as it is dumped from the digesters. The adhesive has properties which make it suitable for use as a binder for foundry cores, in briquetting coal, and other similar uses.

Power Equipment

The installed horse power of the Dubuque factory is 775 hp. and the average load is 650 hp. Electrical power is purchased. Steam for cooking and drying is generated at 160 pounds by a 350 hp., B. & W. boiler. The factory employs about 70 men. Its output capacity is 100,000 square feet of ½ inch board per 24 hours.

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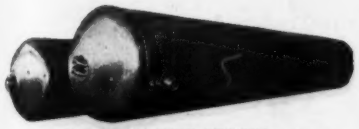
TRY "LANCASTER" *BETTER BUILT PRODUCTS*



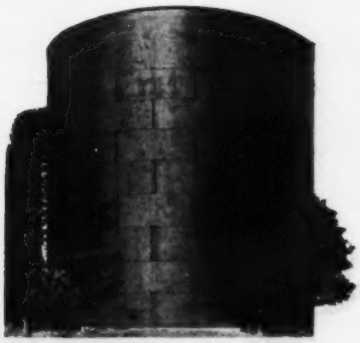
WELDED PRESSURE VESSELS. Gas or Electric Arc Weld

RIVETED PRESSURE TANKS for High Pressures and Temperatures

FRACTIONATING TOWERS. Stills, Evaporators, Washers, Agitators, etc.

NITRIC ACID TANKS. Absorption Towers, Oxidizers, etc., of Chrome Alloy Construction

HYDRO ELECTRIC WORK. Penstocks, Surge Tanks, etc.



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STEEL PLATE WORK . . . CASTINGS AND MACHINE WORK . . . BARGES . . . DREDGE HULLS . . . DREDGE PIPE . . . CHEMICAL AND ACID PLANT EQUIPMENT—

LANCASTER IRON WORKS, Inc., Lancaster, Penna.

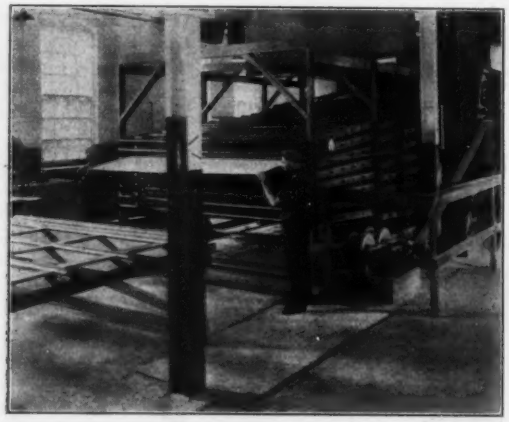
New Wood-Fibre Board Mill Ideally Located

Lisbon Falls, Maine, Where New Insulating Board Plant Is Situated, Possesses Many Advantages For Shipment Into Eastern and Mid-Western Territory and For Export—Anticipate Operating At Full Capacity By End of Year

THE Wood-Fibre Board Corporation which completed its new insulating board plant in November, 1929, and in which the Pejepscot Paper Company, Inc., has a substantial interest, reports a steady increase in production and distribution of "Arborite" all-wood insulating board during the past twelve months and expects to be operating at full rated capacity by the end of the present year. The mill is at Lisbon Falls, Maine, an ideal location for shipment into eastern and mid-western territory, as well as for export.

Process of Manufacturing

"Arborite" is manufactured solely from high grade peeled pulpwood by a purely mechanical means without the aid of chemicals.

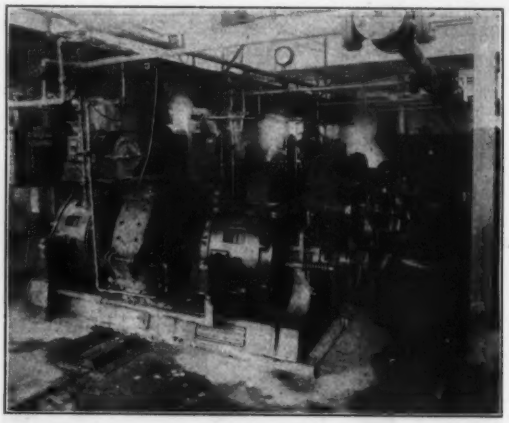


UNLOADING END OF DRIER

The process consists of reducing the pulpwood to small uniform chips, and grinding them in a series of disc grinders to obtain a satisfactory pulp. A continuous sheet eight feet wide is formed on a single vacuum cylinder and passes through a continuous plate press. A traveling mechanical duck then cuts the sheet into twenty foot lengths, which are carried through an eight deck steam drier on chain driven rolls.

Uniformity of Product Assured

The dry, or finishing end of the mill, contains large mechanical saws for cutting the "Arborite" into standard building board



SECTION OF GRINDER ROOM

sizes, four feet wide by six to twelve feet long, and a variety of other equipment for turning out ship-lapped insulating lath and roof insulation, special thicknesses and sizes of "Arborite," beveling and grooving acoustical tile, and finishing board to particular specifications. Automatic controls and testing at all governing points in the process by a trained laboratory staff insure uniformity of the product in every feature.

The chief uses of "Arborite" insulating board include the following: insulation of buildings by use as sheathing, plaster base, interior wall finish, lining of roofs or between floors; roof insulation in industrial buildings to prevent condensation; insula-

PLANT OF THE WOOD FIBRE BOARD CORP., BRUNSWICK, ME.

WOOD ROOM EQUIPMENT

RYTHER & PRINGLE COMPANY CARTHAGE N.Y.

CONVEYERS & ELEVATORS

RYTHER LOG-HAULS

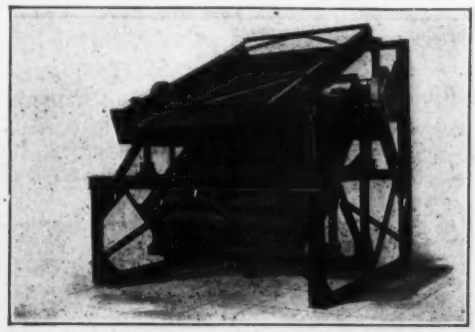
RYTHER LOG-HAULS are constructed to carry any length of logs. Can be constructed of timber or structural steel. Machine parts are heavy and designed for maximum service. The standard design is flexible and can be combined to meet all river and ice conditions.

RYTHER SLASHERS

RYTHER SLASHERS to carry from one to eight saws, for logs of any length, cutting into short lengths as desired. Frame is of structural steel and all machine parts made for maximum service. Each slasher is a complete unit and can be introduced into any cutting-up system.

WOOD CHIP BREAKER

RYTHER CHIP SCREEN



Chips treated with the WOOD IDEAL CHIP BREAKER, installed under the chipper hood, are uniform, thoroughly separated, dusted and free from dirt.

The combination of the WOOD BREAKER and the RYTHER CHIP SCREEN is an ideal one for uniformly screened and perfect chips.

Ask for bulletin No. 126 for WOOD BREAKER and No. 528 for RYTHER HIGH SPEED CHIP SCREEN.

CANADIAN INGERSOL-RAND COMPANY, LIMITED

10 PHILLIPS SQUARE, MONTREAL, P.Q.

tion of refrigerator cars, refrigerator cabinets and cold storage rooms, and sound-deadening.

The outstanding features claimed by the manufacturer for "Arborite" are high insulating efficiency due to exceptionally low density, high ratio of strength to weight, full one-half inch thickness, durability, uniformity and appearance. The density of "Arborite" standard building board is only 14.4 pounds per cubic foot and in order to obtain maximum insulating efficiency, where strength is not a prime requisite, the Wood Fibre Board Corporation is supplying "Arborite" with density as low as 11.5 pounds per cubic foot to some of the largest users of insulating board in the United States.

Association With Pejepscot Paper Co.

While the Wood Fibre Board Corporation is a comparatively new organization, it has, through its association with the Pejepscot Paper Company, Inc., of Brunswick, Me., a background of over sixty years successful operation in the pulp and paper and lumber industries. Junius H. Browne, of New York, formerly president of the Pacific Lumber Company, of Illinois, is president and Edgar Rickard, president of Pejepscot Paper Company, Inc., is chairman of the board of the new corporation.

Included among its directors and stockholders, in addition to Mr. Browne and Mr. Rickard, are Julius H. Barnes, chairman of the United States Chamber of Commerce; John W. Doty, president of the Foundation Company, New York; Thomas Crimmins, president of Thomas Crimmins Contracting Company, New York; Walter Aldridge, president of Texas Gulf Sulphur Company, New York; H. A. Jackson, president of Chicago Pneumatic Tool Company, New York; Malcolm B. Stone, treasurer Ludlow Manufacturing Associates, Boston, Mass.; Gilbert G. Browne, of the banking firm of White Weld & Co., New York; John Nickerson, president John Nickerson & Co., bankers, New York, and Evan Randolph, vice-president Philadelphia National Bank, Philadelphia, Pa.

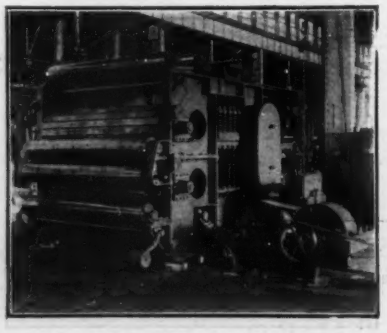
Great Expansion Provided For

While the yearly production of this first unit is only forty million feet of "Arborite," the plant is designed for an ultimate annual output of one hundred and fifty million feet. The manufacturing operation is under the direction of Edgar Catlin, resident manager of the Pejepescot Paper Company, Inc., which also operates pulp and paper mills at Topsham, Pejepscot, and Lisbon Falls, Maine, and controls extensive timber areas in Maine and Canada.

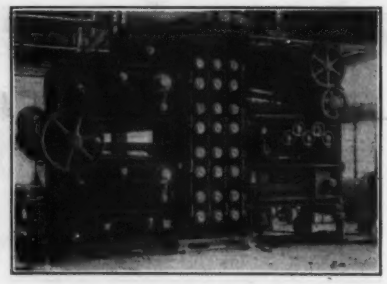
Kutztown Fiber Board and Pulp Washing Process

Kutztown Foundry and Machine Company, of Philadelphia, with plant at Kutztown, Pa., have made an enviable reputation in the paper industry as builders of Continuous Pulp Washing and Fiber Board Presses.

By the use of the Kutztown Pulp Washing Press increased efficiency may be obtained through the use of an entirely different method of manipulation of the pulp which makes it possible to accomplish the result by the use of relatively small quantities of water. The initial step consists in subjecting the pulp to pressure to at once squeeze out most of the water so that the greater portion of the chemical content therein will be immediately removed from the pulp.



FIBER BOARD PRESS



PULP WASHING PRESS

Thereafter, water is added to the pulp which is then subjected to a further pressing operation for freeing the pulp of the water last added together with such additional chemicals as may have become admixed with it. These operations are repeated and before each pressing additional water is added to further dilute the chemical content so that when the pressing takes place the water removed during such operation carries off with it a part of the chemical in solution.

The washing operation is accompanied by a shredding and intimate admixture of the pulp with the diluting water thus materially increasing efficiency of the operation. Plain water is used only in the last stage of pressing and this water is used over and over again in the next stages until it is discharged to the evaporators. By this method the amount of water ultimately used is but a small fraction of that used in existing practice.

The operation of the Fiber Board Press is carried on in the following manner: The material from which the wall or insulating board is to be made is first digested or treated by some acceptable method to put the pulp in proper and uniform condition. It is then delivered to a forming machine the same width the press is to handle the material. From this forming machine it is delivered directly to the press in a continuous strip or ribbon of uniform thickness, and of such thickness as is required to deliver the board from the press. This continuous ribbon passes through the press composed of two heavy steel movable aprons, one on the top and the other on the bottom.

As these aprons converge the material passing through is gradually pressed, eliminating the liquor to the extent required for the future use of the board. At a certain point these two aprons run parallel to one another for a limited distance to permanently form the thickness of the board. After passing through this stage it is delivered from the press usually to a table where it is cut to the sizes required and further treated to complete the board.

The pressing zone is composed of two heavy girders, and the necessary pressure is regulated by means of heavy springs. This pressure within certain limits in a standard machine is regulated to suit the character of work to be done. Boards for certain purposes are pressed to a greater extent than boards used for insulating purposes.

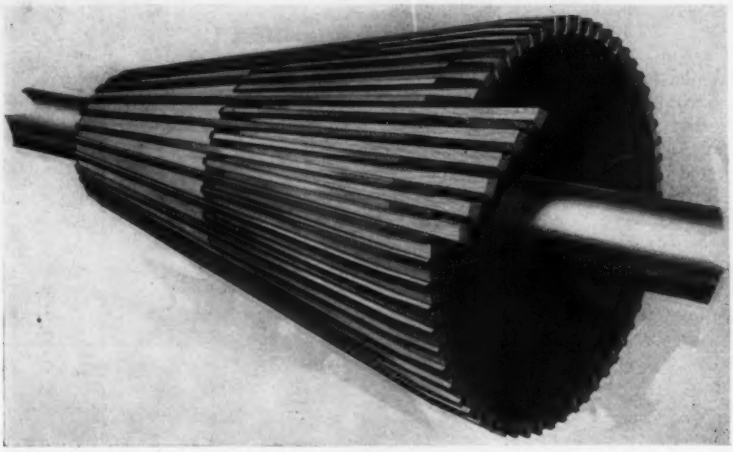
National Paper Box Plant Extension

The National Folding Box Company, of New Haven, Conn., is extending its plant in the form of a new building, about 80 x 180, four stories in height, heavy fireproof construction, with special railroad siding to accommodate our increasing business in specialty boxes. The building when completed will cost around $250,000.

Bolton Inverted Wedge Plug makes every grade of paper

INVERTED WEDGE PLUG

Wedges larger base than top — solid wood — no notches. Knives and wedges locked into plug body. Both driven in from end. Cannot raise or spring. Increased pressure makes tighter fit. One plug takes any size knife.



ORDINARY PLUG

Wedges larger top than base. Work loose and wash out. Knives up on stilts above plug body. Rings and woods only support knives. Increased pressure lifts woods and knives, stretches and snaps rings. Change in knife size requires another new plug.

COMPARE

TEN FACTS

1. INVERTED WOODS — cannot come out.
2. Reduces maintenance and renewals
3. Absolute rigidity—eliminates vibration
4. An easy one man job to install and replace
5. Greater utility — one plug takes any size knife
6. You never have to buy another plug
7. Increases production with longer life
8. Provides perfect control—less power and better paper
9. Universal application—any size, any Jordan
10. Quickly pays for itself out of savings

MORE than 150 Bolton Inverted Wedge Plugs are in daily operation in more than 70 different mills — some for more than five years — *and not one complaint!* Used to refine every grade from New York city dump stock to the finest rag linen, bond and ledger, Bolton Plugs have been tested under the severest conditions and outlasted ordinary plugs every time.

Mills report fewer shutdowns for repairs and replacements, maintenance and renewal costs reduced 30-50%, tonnage increased and quality and uniformity improved. Built to fit any Jordan, write for Bulletin and prices.

John W. Bolton and Sons, Inc.

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3983

Powell River Expansion Nearing Completion

$13,000,000 Is Being Expended of Which $8,000,000 Is Being Poured Into the Hydro Electric Project at Lois River And Additions to the Existing Plant at Powell River—Two 226-inch Dominion Engineering Works Fourdriniers To Be Installed

By J. A. Lundie, Editor, "Powell River Digester."

PULP and paper, today the largest manufacturing industry in Canada, is of comparatively recent origin in British Columbia. While the first pulp mill in the history of the Dominion was erected at St. Andrews, Quebec, in 1803, it was over a century later before the first faint stirrings of pulp and paper life were heard in British Columbia's industrial world. With the dawn of the present century, pulp leases, granted on liberal terms by the Provincial government, started the industry on its hesitant and awkward passage. These early beginnings were cradled in inexperience and disappointment. Several years elapsed before the white outlines of a producing mill appeared in Canada's far West. Between 1908 and 1910, one or two inadequately organized plants attempted the production of pulp—with very indifferent success.

Powell River Co. Formed in 1910

In 1910, the Powell River Company was formed. With its entrance into the field, was laid the first solid foundations of the pulp and paper industry in British Columbia. By April, 1912, a new and permanent industrial site had been conjured up from a wilderness of tall trees and forbidding stumps; two Pusey & Jones news print machines, of 150 inches and 156 inches respectively, operating at a speed of 670 feet per minute, had been installed; and in that month the first ton of news print shipped from a British Columbia mill, steamed southward down the Gulf of Georgia.

Many Changes in Nineteen Years

Many changes have altered the face of the landscape in and about Powell River since that memorable April day, nineteen years ago. New machines have been installed; the plant has been extended and enlarged; production has more than doubled; population has increased five fold. Today the Powel River plant takes place among the first five largest individual paper mills on the continent; it is the largest news print producer on the Pacific Coast; it is among British Columbia's leading producers and consumers of power, and is one of the basic pillars on which rests the prosperity of British Columbia.

Present Capacity in Excess of 520 Tons

The present plant capacity is in excess of 520 tons of news print daily. Since the installation of the first two machines, with an output of 100 tons, four new machines have come into production. Two 184 inch Pusey & Jones machines followed immediately to raise production early in 1913 to 250 tons daily. In 1926, two high speed 234 inch Walmesley machines increased

GENERAL AERIAL VIEW OF THE MILL OF THE POWELL RIVER CO., POWELL RIVER, B. C.

The PROVED Alloy for the Sulphite Mill

THE trend toward ENDURO NIROSTA KA2 has gone far among sulphite mill operators, because this improved alloy shows greater resistance to conditions of sulphite operation than any other commercial alloy so far produced.

• For digesters, coils, relief lines and numerous other applications ENDURO, carefully processed according to patented Krupp specifications, is a proved metal. Specify it on your next order for new equipment or for all replacements.

ENDURO
• NIROSTA KA2 •

• Republic engineers will be glad to discuss the applications of this improved material in your plant with you. Write for complete information. •

Central Alloy Division

REPUBLIC STEEL CORPORATION
MASSILLON, OHIO

the paper machine installation to six. These machines have since attained an average output which is in excess of 270 tons per day, a performance well above their rated capacities.

At the time of writing, the hum of another construction period is in the air. In November of last year, the Powell River Company was awarded water rights on the Lois River watershed, thirteen miles south of the present site. A program of plant extension was immediately undertaken. The opening chapter of this program, now in its final phase, will increase the daily output from 520 to 650 tons in the opening months of 1931. Plans have been prepared covering an ultimate plant capacity of 1100 tons of news per day.

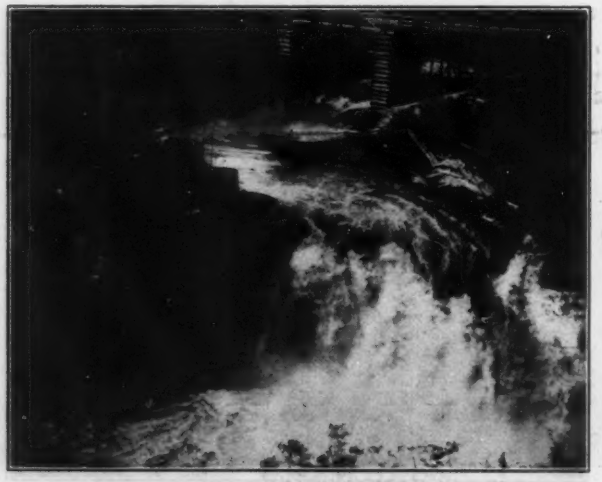
Two Clearly Defined Phases of Work

In this, the third construction period since 1913, the work consists of two clearly defined phases. At Powell River itself, plant extension activity proceeds apace—the erection of new buildings and the installation of new machinery. Co-existent with this is the big hydro electric development, carried on thirteen miles away, on the Lois River watershed, where new power to turn the wheels of present and future progress is being stored and generated. This latter operation unfolds a new chapter in the history of the Powell River Company. For the first time, power, other than that generated at Powell Lake is being harnessed to meet the requirements of the plant. The Powell Lake watershed, was in 1926, developed to its full capacity of 50,000 hp., all of which is absorbed by the present output of news. Fresh expansion necessitated the reaching out for a new power source. This, as suggested, was found in the conveniently located watershed of Lois River and when the final hearing of the water board at Victoria recognized the company's application, the "all clear ahead" signal was given. A new era of expansion was ushered in.

A Further Expenditure of $13,000,000

In 1926, the Powell River Company carried through a $10,000,000 extension program. Four years later, it is launching another construction offensive, comprehending a further expenditure of $13,000,000, $8,000,000 of which is now being poured into the hydro-electric project at Lois River, and additions to the existing plant at Powell River.

Powell River has been a busy spot for the past eight months. A machine room, a new grinder room, extensions to the existing sulphite and screen rooms and numerous minor additions and improvements—all these have imparted an air of bustle and activity—to supplement the steady purr of the news print machines.



LOIS RIVER FALLS BEFORE ERECTION OF DAM

New Machine Room Practically Completed

The new machine room has been practically completed and at the time of writing the first machine is being installed. This building is constructed to house two 226 inch news print machines, generally similar to the two 234 inch ones installed in 1926. The machines are being constructed by the Dominion Engineering Works and are designed for speeds up to a maximum of 1400 feet per minute, instead of 1000 feet. Their equipment will include removable Fourdriniers, two suction presses and fifty-two 5 feet driers—ten more than the large 234 inch Walmesleys. The first machine is expected to be in operation about February 1; the second will be installed when market conditions justify. The paper machine drive is of the d. c. sectional type, furnished by the Harland Engineering Company of Canada, Ltd. The drive will embrace fourteen motors, eight of which are attached to the driers.

A major percentage of the power now being generated at Lois River will be transmitted to supply the fourteen additional grinders, which have just been installed. These grinders are grouped in lines of six, each line being driven by a 3,600 hp., 273 r.p.m. synchronous motor. This, in itself, is a new departure in the Powell River plant. The fifty-two grinders now supplying the present mill are all water driven, the turbines drawing direct from the Powell Lake dam.

Steam Requirements

Steam requirements for the first paper machine are furnished by the installation of one B. & W. water boiler, rated at 950 hp. and capable of operating at up to 425 per cent rating. The boiler will generate steam at 600 lbs. pressure. It will be equipped with water walls and every modern improvement to ensure economical operation. As with all the remaining steam units, the boiler is constructed to burn hog fuel or oil, with provision being made for the future possibility of its conversion to a powdered coal unit.

Other minor additions include extensions to the wood room, the sulphite screen room, and the installation of one 16 ton Digester.

The Outstanding Feature

Undoubtedly the outstanding feature of the present expansion to the Powell River mills is the hydro-electric development at Lois River. In place of direct penstock connection between the dam and the plant, the power must be transmitted by wire over thirteen miles to the centre of consumption. The Brooks Scanlon interests, principals in the present Powell River Company, were pioneers in the Lois River area, where over twenty years ago, their operators began logging on the Stillwater tract. Some of the finest and most perfect firs and cedars ever logged in the West were cut from this area. The tallest flagstaff in the world, 214 feet in height, now standing in London's world famous Kew Gardens, was born on the banks of Lois River. Several other mighty "sticks," averaging well over 200 feet in height, after cutting and trimming, were pulled down the old Lois logging railroad to tidewater.

Lois River drains a community of waters, long known as the Gordon Pasha Lakes. As a hunting and fishing paradise this district has been a favorite haunt of British Columbia sportsmen. The Pashas are justly celebrated for the size and fighting spirit of their rainbows and cutthroats. In their upper reaches stands of virgin timber await future development. The damming of this 184 square miles of watershed was a less simple task than the original development at Powell Lake. There 1600 feet penstocks run direct to the generators. Here, to secure a site for a permanent dam at Lois River, it was necessary to strike nearly two and a half miles above the site chosen for the power house. The location, in addition to the transference of power to Powell River by high tension wires, involved a 5800 foot tunnel, through solid rock and a 2700 foot penstock.

To Be Developed in Two Stages

The Lois River program will be developed in two stages. To

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Specify NEVERSLIP floor plates

The Plates with the "PERFECT DIAMOND" Pattern

You can't go wrong, if you "specify" NEVERSLIP FLOOR PLATES—because they're Rolled from highest grade Open Hearth Steel, to give a NON-SLIPPING, LONG WEARING SURFACE, easy to walk upon, and affording maximum safety to man, beast or vehicle.

NEVERSLIP FLOOR PLATES "are different" from other plates, not alone due to their distinctive PERFECT DIAMOND PATTERN—but because of their design and method of manufacture.

NEVERSLIP FLOOR PLATES are available in the PERFECT DIAMOND PATTERN or the straight corrugated RIBBED PATTERN. They are effectively and economically used for a multitude of purposes—such as: Flooring, Walkways, Stair Treads, Runways, Platforms, Fire Escapes, Thresholds, Trench Covers, Traffic Plates—or, in short, wherever a LIGHT, NON-SLIPPING, STRUCTURALLY STRONG SURFACE IS REQUIRED.

AMERICAN PRESSED STEEL CO.

Commercial Trust Building—Philadelphia—Penn.

(Representatives in Principal Cities)

American Pressed Steel Co.,—Commercial Trust Bldg.—Philadelphia, Pa.

Please send me your Literature and a Sample of NEVERSLIP Floor Plates for the following uses:

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P-T-J-10-30

meet the requirements of immediate expansion, a 22,000 hp. generator has been installed at the Power House, with provision for a second similar unit in the future. For various reasons company engineers decided that for this first 22,000 hp. installation, they would construct a temporary dam, rather than proceed immediately with the permanent structure.

This temporary dam has now been closed, and the waters of Lois are gradually rising and spreading over the old logging concession. The dam is a rock filled, log crib structure and at its height of 55 feet, will provide lake storage sufficient to equalize flow for the first 22,000 hp. unit. The spillway length is 200 feet, with a total length at the bulkheads of 300 feet.

The Permanent Dam

The permanent dam, to store the ultimate 44,000 hp. of Lois, will be a variable radius arch, reinforced concrete structure. With the foundations striking 55 feet below river bottom, the actual dam height will reach 200 feet. The length at the bulkhead section of the abutment will be 828 feet. A spillway section 165 feet long, equipped with crest gates raised to the maximum storage level, will be constructed one side, 15 feet below high lake level. Estimates recently compiled, place the lake storage at 403,000 acre feet, more than sufficient to equalize the entire stream flow.

The harnessing of Lois River's white coal requires four separate sections of penstock. Between the site of the temporary and permanent dams, a 2700 foot wood stave pipe, a temporary erection, carries off the water on the first lap of its journey to the Stillwater power house. Beyond the permanent dam site, the installation as now constructed will form a part of the permanent structure and will be built to accommodate the flow for the maximum 44,000 hp. At the permanent dam site, the wood stave pipe therefore connects with a 12½ foot concrete pipe line, 850 feet in length, which constitutes the second section.

Water Passes Through Concrete Tunnel

From here the water passes through the 12½ foot concrete lined tunnel, 5800 feet in length, leading out into the 2700 foot steel penstock, which connects direct with the generators at Stillwater. On this installation is built the big surge tank to take care of surges due to governor action. When completed, this tank, 30 feet in diameter, will be a landmark for the surrounding district, towering, as it does, 312 feet above the foundations. At this height a clear 44 foot above high lake level will be ensured. At the power house, the penstock forms a Wye—one branch carrying water to the 18,000 K. V. A. C. G. E. generator already installed; the other to supply the second unit, when the full storage is developed. The two branches are controlled by Johnston Larner valves.

The transmission line from the Stillwater power house to the Powell River plant is 12.6 miles in length. In its final stages, provision has been made for complete duplication of the line, in the event of suspension of operations over one line, the second will be capable of transmitting to Powell River the maximum power that may be developed at Stillwater.

This will be the power line as ultimately constructed. The present installation, however, consists of only one line, which has been completed, and over which power has already been transmitted to Stillwater for construction purposes.

The Transmission Line

The transmission line is of cedar pole construction, with an average pole spacing of 300 feet, save that one point where an 800 foot span was necessary. An alluminum steel cored cable with an overall diameter of ¾ inch, was used throughout for the main transmission line.

The pole line is equipped with telephone lines, to ensure speedy communication between the plant and the new generator station. Provision has been made for the stringing of a control cable, by means of which the operation of the Lois River generating station will be controlled entirely from the central generator room at Powell River.

VIEW OF 2700 FT. PENSTOCK

Less noticeable in the busy hum of actual extension is the business of providing additional accommodation for the expanding population of Powell River. Since January last, thirty-one new homes have been built or are under construction for company employees. These houses are equipped with every modern convenience, artistically designed, and built with pleasing variety. The drab uniformity of design—the stiff, unbeautiful, Prussian like precision in townsite planning often found in "company towns," has been avoided at Powell River. Utility and beauty are intermingled in the homes; rows of cedars, oaks, poplars, fringe the streets; flowers bloom in the gardens and about the well trimmed lawns; residents evince a real pride in maintaining the townsite's reputation as a city of beautiful homes and gardens.

In 1911, twenty homes encompassed what was then Powell River. Since that date townsite construction has rapidly advanced; today 440 houses, exclusive of two apartments, with a total of 32 suites, comprehend the housing accommodations of Powell River townsite.

Other Subsidiary Work

Other subsidiary work includes the extension of the golf course, part of which was unavoidably detached for plant extension, and the construction of a new athletic oval, equipped with grandstand, lockers, showers, cinder track, football and baseball pitch, etc.

It is a full program on which the Powell River Company has embarked. In addition to their business as news print exporters, they must undertake all the duties of the "City Fathers"—building playgrounds, providing adequate social and community centres and in general assuming all the functions of a mayor and city council.

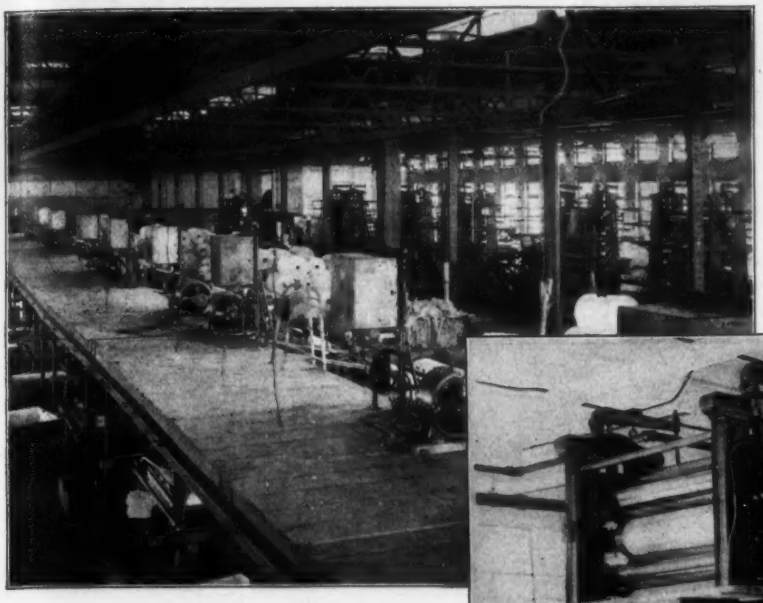
This, in brief, is the work on which the Powell River Company engineers and architects are now engaged, a work which not only brings the plant to the forefront of news print producers, but which is also maintaining the district's reputation as one of the most progressive and self contained communities in Canada.

Hayton-Pascol Pump Installations

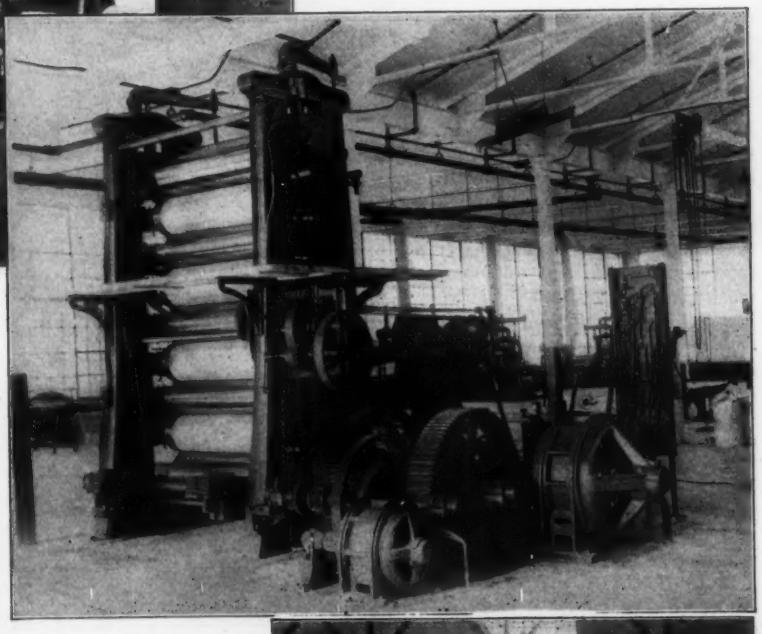
All of the stock chest agitation equipment at the new mill of the Powell River Company, Ltd., Powell River, British Columbia, consists of Hayton-Pascol pump type agitators. Ten of these agitator pumps have been installed in this mill; all being the No. 16 size with capacities of 4200 gpm each. These pumps were built by the Port Arthur Shipbuilding Company, Ltd. of Port Arthur, Ontario, from designs furnished by the Hayton Pump and Blower Company, Appleton, Wis.

Most of the agitator pump installations at this mill have been made on flat bottom, rectangular chests with a midfeather through the center, around which the stock circulates. The arrangement

"BUILT BY NORWOOD"



—but developed with the co-operation of the entire industry



NORWOOD Paper Finishing Machinery and Norwood Filters have been developed to their present high efficiency through nearly forty years of close co-operation between Norwood engineers and paper mill men themselves. It was through this mutually beneficial partnership that Norwood produced the first glassine calender to be built in America. It resulted in the first dampening machine and countless improvements and developments in paper mill equipment of all types—and the pioneering still goes on.

Whatever your filtration or paper finishing problems are, you may be sure of the complete co-operation of Norwood engineers.

You should have the Norwood Paper Finishing Machinery Catalog and the Norwood Filter Catalogs. We will gladly send them on request.

NORWOOD ENGINEERING CO.
17 No. Maple St., Florence, Mass.

(Directly above) A Norwood Super Calender with two motor drive.

(Top left) A finishing room equipped with Norwood Super Calenders.

(At right) An installation of Norwood Gravity Filters.

NORWOOD

FILTERS - CALENDERS - PLATERS - DUSTERS - RAG THRASHERS - FOLDING MACHINES - SUCTION BOXES

used for the ground wood chests is especially interesting. There are three separate chests with a midfeather in the center, and the stock is transferred from one compartment of one chest to one compartment of a different chest, and the chests themselves inter-connected so that a very thorough mixing and distribution of the stock is obtained.

One of these pumps is connected to a vertical round chest 18 foot diameter by 17 feet high, and containing about 3 per cent stock. This round chest also has a central midfeather around which the stock flows. The sizes of the various chests on which these pumps are used varies somewhat, but they are near enough the same size so that the same size agitator pump is used for all. This makes the pump parts inter-changeable, which feature is an important consideration due to the remote location of this mill.

The agitator pump used, is a low head, large capacity pump with a screw type impeller, which has been developed by the Hayton Pump and Blower Company, Appleton, Wis., for use on agitation and other low head work.

Among the new machinery six 10 x 30 feet U Barking drums made by Fibre Making Processes, Inc., Chicago, were installed in the plant.

Supervising and Directing Staff

Supervising and directing this $13,000,000 expansion program are R. Bell-Irving, Powell River Company resident manager; P. Sandwell, resident engineer; B. C. Condit, retained as consulting engineer; and W. B. Zumwalt, plant general superintendent.

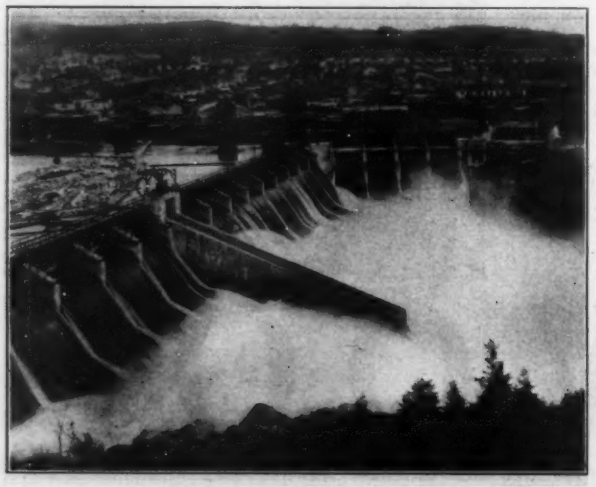
In Mr. Bell-Irving, the Powell River Company has, as resident manager, a man trained in the engineering profession. His qualifications in this respect enable him to exercise an intelligent supervisory control over the present development. In 1924, when the company's $10,000,000 extension program was announced, Mr. Bell-Irving, as resident engineer, was in direct charge of operations. On the appointment of A. E. McMaster to the post of general manager, he was promoted to his present position of resident manager at Powell River.

P. Sandwell, as resident engineer, is in direct charge of the construction program, both at Lois and Powell River. Securing his engineering training in England, Mr. Sandwell came to Powell River in 1920. During the busy days of 1924-1926, he acted as chief assistant to Mr. Bell-Irving, and when the latter took over the duties of resident manager, Mr. Sandwell's services were recognized by his promotion as resident engineer.

B. C. Condit is widely known in Pacific Coast engineering circles, as a consulting engineer. In the last extension period he was chief advisor to Mr. Bell-Irving, and his services were again engaged when plans for further extension were promulgated. Mr. Condit is an expert on hydro-electric problems, and with the Lois River project in the forefront of the present construction, his services have been much in demand.

Co-operating with the Powell River engineering staff, is W. B. Zumwalt, the plant general superintendent. Mr. Zumwalt is well known in paper circles of the Pacific Coast. He has been connected with paper mills for over forty years, and helped install many of the early machines in the Western States.

Under the direction of these men, the construction program has been maintained steadily on schedule, and with previous performances as a criterion, there is little doubt that the present construction period will be brought to a happy and successful conclusion.



POWELL RIVER DAM WITH GATES OPEN

Wiener Refiner Built on a New Principle

John A. Wiener, Oswego, N. Y., inventor of the Wiener Pulp Refiner which was recently placed on the market, makes many interesting claims for this machine.

Mr. Wiener states that it is not natural for raw stock to enter a refiner through the small end. He claims that by reversing the principle of the operation, raw stock is refined more naturally, hydrated more thoroughly, produced more quickly and with less horse-power.

In the Wiener Refiner, the raw stock enters the large end. Thus the coarse stock first comes in contact with the large teeth and then as fibers become separated and smaller, they pass on to the smaller finer teeth at the small end of the machine. He claims this is the natural cycle for the stock to follow and states it has proven to be a decided advantage over the old way where the stock enters the small end of the refiner and is partially refined by the small teeth and then passed on to the large teeth, which it is claimed, are too large to further refine the small fibers.

By letting the coarse stock come in contact with the coarse teeth first, and then as the fibers become smaller, letting them come in contact with the small teeth, the manufacturers of the Wiener Refiner claim they are able to secure better hydration, a better and different finished stock, and a saving in power of over twenty-five per cent.

The Wiener method eliminates the necessity of a pump, for when the stock goes in the large end, there is a small hydraulic pressure set up by the action of the impeller which forces the stock through the machine and out the small end, to a height of from ten to twenty feet depending upon local conditions. It is also claimed that this pressure forces water into the fibers and hydrates more thoroughly than is possible in any other way. Furthermore, the teeth cut the fibers lengthwise, thereby obtaining longer fibers and also using less power as it is easier to cut with the grain than against it.

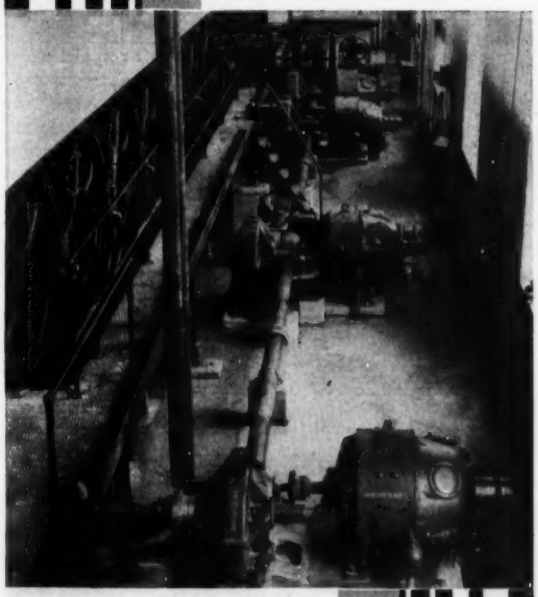
The manufacturers of the Wiener Refiner state that they have made installations in several large mills using various grades of stock from coarse wall board stock down to the finest grades of paper stock. In each case, the installation of one Wiener Refiner has secured orders for them for one or more additional machines.

Chicoutimi Mill to Shut Down

[FROM OUR REGULAR CORRESPONDENT]

OGDENSBURG, N. Y., October 26, 1930.—Announcement was made here this week that the ground wood pulp mill of the Quebec Pulp and Paper Company at Chicoutimi would be shut down on October 31 for an indefinite period. Lack of orders is said to be the reason for the suspension of operations although it is not expected to be permanent. The company is a subsidiary of the Canada Power and Paper Company and the firm of Price Brothers. A report to stockholders from the head of the Quebec Corporation says that events during 1929 have supported the previously given opinion that the manufacturing and marketing of ground wood pulp hold no definite hope of profitable development.

Paper Production won't "*trip over the heels*" of this drive . .



One of two Cutler-Hammer Drives installed in the mills of the Mead Pulp & Paper Co., at Chillicothe, Ohio, under the supervision of the Management Engineering & Development Co., Dayton, Ohio. This installation "went right to work" the first time stock was put on the wire, producing 71,000 lbs. of paper the first day, 84,000 lbs. the second.

THE maximum of paper production should always be determined by the capacity of your paper machine . . . *never* by any limitations of the paper-machine drive.

For maximum tonnage, week in and week out, install the drive that never "gets in the way" of production . . . the Cutler-Hammer Drive.

Giving you full control over your machine, either section by section or as a whole, it maintains perfect draw. World's tonnage records are held by machines equipped with this drive. Fifty-hour runs are commonplace. The speed and weight changes necessary on jobbing-machines are made easily, quickly, with minimum waste in off-weights.

The Cutler-Hammer Drive is simple, easy to understand, install, maintain. On new installations, the machine goes into production usually the first day stock is put on the wire.

In view of the record the C-H (Harland) Drive has already won here and abroad, it is worthy of full investigation on your part. Send for the booklet "*Keeping Paper on the Reel.*"

CUTLER-HAMMER, Inc.
Pioneer Manufacturers of Electric Control Apparatus
1274 St. Paul Avenue
MILWAUKEE, WISCONSIN

CUTLER HAMMER

Harland Electrically Interlocked Paper Machine Drive

(A-258)

Mead Corp. Spends $5,500,000 At Chillicothe

Improvements Include Fifty Ton Straw Pulp Mill, the Addition of a 220-inch Pusey & Jones Fourdrinier, One of the Largest Book Machines in the United States, and the Erection of a Modern Power Plant—Straw Pulp Mill Is Only One of Its Kind

DURING the past year the Mead Corporation has completed an extensive program of expansion to its book and coated paper mill at Chillicothe, Ohio, involving an expenditure of approximately $5,500,000.00. The newly built units include a fifty-ton mill for the manufacture of white pulp from straw by a new process developed and controlled by the Mead Corporation. Initial equipment has been installed with a daily capacity of twenty-five tons. There has also been erected a two machine paper mill with one 220-inch machine of sixty tons daily capacity, together with all necessary steam and electrical power equipment. The plan and site provide for a considerable further expansion in both the pulp and paper mills when required.

Erected by the Management, Engineering and Development Company, of Dayton, Ohio, the new plants are of brick, steel and concrete construction of modern design having the majority of the exposed wall area in glass, the sash being of the continuous type running from the ground floor to near the cornice. Finished with rather massive caps and coping, the buildings are of a type rather unusual in industrial layout. The plants cover two city blocks.

Straw Pulp Mill

The straw pulp mill with a total floor area of 169,980 square feet consists of the following units:

Buildings	Stories	Dimensions in Feet	Sq. Ft.	Cu. Ft.
Straw Storage	1	648 x 100	64,800	3,240,000
Bleach Making	1	36 x 54	1,950	44,800
Bleach Plant	3	54 x 72	11,700	214,000
Receiving	2	36 x 72	5,180	118,780
Steeper	3	72 x 162	35,000	500,000
Raffold	2	72 x 108	15,500	250,000
Digester	3	50 x 110	16,500	231,000
*Digester	3	55 x 90	15,150	222,200
Recovery	2	35 x 90	4,200	97,650

* Design prevents showing of this unit in one set of figures.

To a considerable extent, the pulp mill is equipped with machines specially designed for this process and others improvised from standard makes, and all equipment is so arranged that the present twenty-five ton capacity of the mill may be doubled.

Although straw was used in America and Europe during the eighteenth century for the making of a high grade of bleached pulp suitable for printing and writing papers, with the introduction of Esparto in Europe about 1860 and of wood pulp in America in the '70's, the use of straw in printing papers began to decline and gradually become confined to making strawboards and various grades of wrapping paper. This fact is accounted for by the difficulty of obtaining a clean, white pulp from straw. Owing to the drastic treatment which was necessary to remove knots and other incrusted materials, the yield was low, not exceeding 30 percent of the straw used, and the difficulty of eliminating knots and shives lowered the grade of the pulp and therefore its value as compared with the pulp obtained from wood.

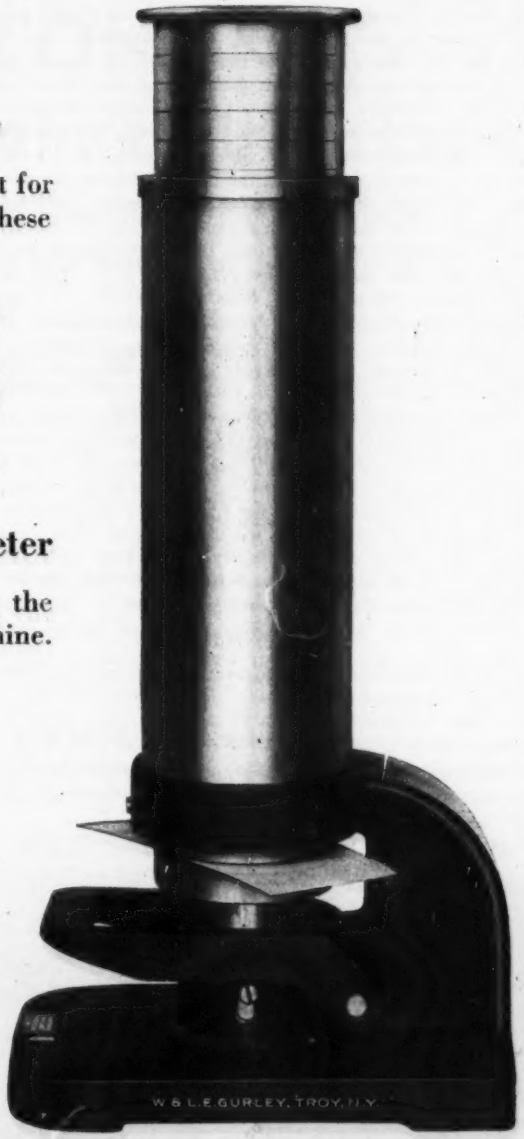
MEAD CORP. MILL, CHILLICOTHE, OHIO, SHOWING NEW DEVELOPMENTS INCLUDING MEAD STRAW PULP CO.

Two New Paper Testing Instruments by Gurley

Improved Gurley Densometer

A new design of this widely-used instrument for measuring the porosity of paper. It has these advantages.

1. No special size of sample required.
2. Air pressure not increased by weight of sample.
3. Simple, rapid, method of clamping sample.
4. Uniform pressure on sample, by heavy spring action.
5. Self-aligning orifice plates.
6. Pressure and orifice opening can be varied.



No. 4110 Improved Gurley Densometer
Price $125.00

Gurley Running Sheet Micrometer

A portable thickness gauge for measuring the running sheet of paper on the paper machine.

FEATURES

Measures 8 inches from edge of sheet.
Paper slips through crowned, ground rollers.
Double handles for holding on running sheet.
Shielded micrometer frame.
Light, strong, rigid.

No. 4150 Gurley
Running Sheet Micrometer
Code Word ABSIY
Price $300.00

Send for Bulletin

W. & L. E. GURLEY

Main Office and Factory, Troy, N. Y.

New York City Sales Office
49 Chambers St.

During the past several years, the Mead Corporation has conducted a continuous investigation of the numerous problems involved in establishing a process which is commercially feasible and economically profitable, with the result that the present straw pulp mill went into operation on May 12 when the first digester was blown.

In this process, the bales are carried from the straw storage shed, which is capable of storing 10,000 of the 25,000 tons of straw required to operate the pulp mill for one year on a twenty-five tons per day basis, to the receiving room by a Mono-rail electric crane system designed to pick up and carry twelve bales at a time. After the wires have been removed, the bales are fed into a continuous steeper containing a hot solution of caustic soda of regulated strength. A drag conveyor, with compartments of the proper size, moves the bales along the caustic soda solution during which time the straw is thoroughly impregnated and wilted. The bales as they emerge from the steeper go through an expeller which removes the surplus liquor which is fed back into the steeper. The pressed straw is then carried by conveyors to the digesters. Rotating digesters are used and as the straw has been thoroughly impregnated during the steeping, it only requires to be steamed for a short period, at over 100 pounds pressure, to thoroughly cook it, when the digester is blown in the same manner as with wood. The black liquor is removed by filteration on Oliver United Filters, the pulp is then screened, riffled, rescreened and then goes to the bleaching process for conversion into high grade white pulp. The black liquor on the other hand goes to the multiple effect evaporators where it is brought down to the consistency of molasses and then burned in incinerators of the new Wagner type. The resulting ash, which consists mainly of sodium carbonate, is bleached out with water and converted back into caustic soda by the well-known lime causticizing process.

Paper Mill

In the construction and equipment throughout, the company has taken advantage of the latest developments for a modern paper mill. Consisting of beater, jordan, paper machine and finishing rooms, it has a total floor space of 154,192 square feet. The paper machine, 220 inch Pusey & Jones make, has a maximum trim of approximately 210 inches, and is one of the largest book machines in the United States.

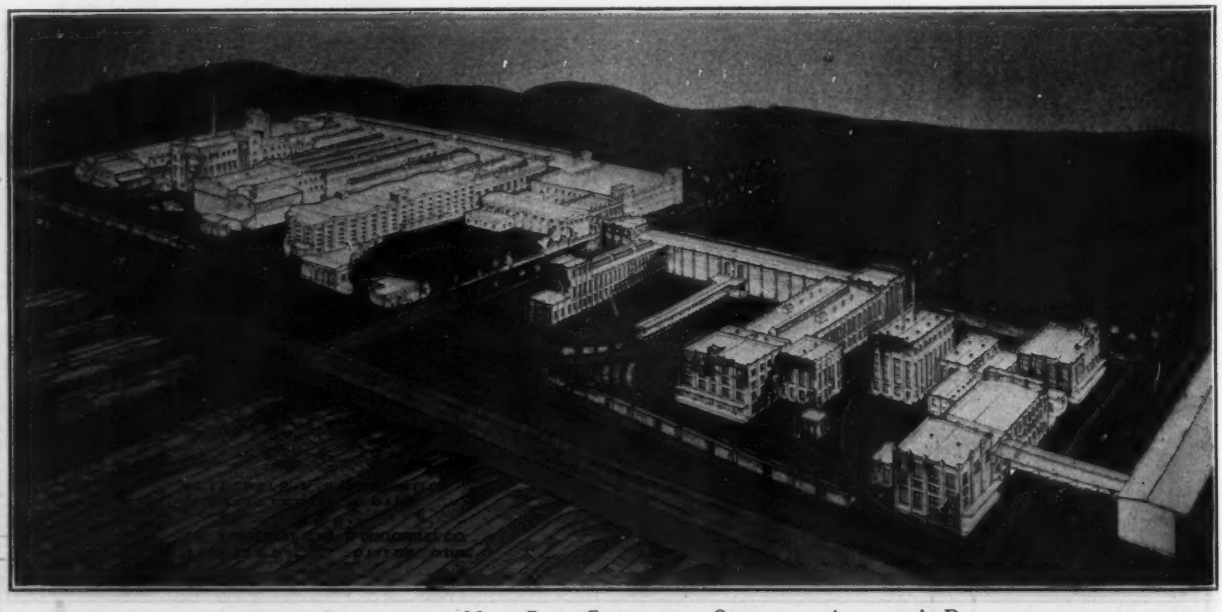
It is housed in a room 270 feet by 106 feet, location being provided for the installation of another machine near the present one when required. The machine is equipped with a removable fourdrinier and Aldrich high speed shake. A Fulton System of steam circulation has been used and a Moore & White four-drum winder completes the dry end of the machine. Each drum of the winder is furnished with an individual motor, separately controlled so as to give maximum flexibility of operation. The machine is driven by a Harland Drive and has a speed range of 250 to 750 feet per minute. An American continuous disc-type of filter has been used in the installation.

NEW BOILER HOUSE

The paper machine is served by four (4) Jones Majestic Jordans direct-connected to 250 h.p. synchronous motors, and four (4) Midwest high-speed beaters. Jordans, rifflers, head box, filter and most of the other auxiliary equipment are housed in rooms adjacent to the machine.

Power Plant

Both the straw mill and new paper mill are served by a power plant of the very latest design, consisting of a modern pulverized coal installation working in conjunction with an extraction



EXPANDED PLANT OF THE MEAD CORP., CHILLICOTHE, OHIO, FROM ARCHITECT'S DRAWINGS

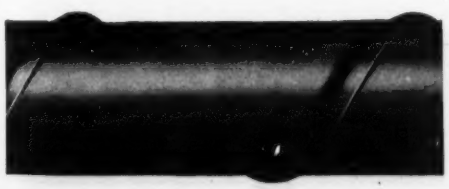
STRUCTURAL ECONOMIES of Naylor *SPIRALWELD* Toncan Iron Pipe

CROSS SECTION BEFORE WELDING

The lock-seam takes the load, thereby relieving the weld of any stress, the weld being only a seal.

CROSS SECTION AFTER WELDING

The "Heel" which, in spiral form, extending for the entire length of the pipe, is responsible for the flexibility of Naylor Pipe. This flexibility provides for expansion and contraction, shock fluid load and vibration which are destructive to a weld on a rigid structure.



Naylor Pipe has definite economic values not found in other pipe

First—Naylor Pipe weighs one-half as much as standard weight pipe, but possesses unusual strength provided by the *spiral-welded* lock-seam. Every length of Naylor Pipe is mill tested to the following pressures:

Diameter of Pipe	Mill Test Lbs. Per Square Inch	Diameter of Pipe	Mill Test Lbs. Per Square Inch
6"	900	14" O. D.	450
8"	800	16" O. D.	400
10"	700	18" O. D.	350
12"	500	20" O. D.	325

Second—the structure of Naylor Pipe is unique in that the *spiral-welded* lock-seam provides a continuous expansion joint. This is due to the fact that the heel of the lock is able to move minutely, thus shortening and lengthening the pipe when strains are put on the line due to temperature changes.

Another feature of the Naylor structure which should not be overlooked is its ability to *withstand shock fluid* loads, this feature resulting from the cushioning effect incorporated in the *spiral-welded* lock-seam.

No other line-pipe has been designed that incorporates all the economic savings of maximum structural strength and an iron alloy for long life.

[Catalog 30-2 gives more complete engineering and metallurgical data]

NAYLOR PIPE COMPANY, Main Office & Plant, 1230 E. 92nd St., CHICAGO

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TONCAN COPPER

Naylor Pipe

Maximum Structural Strength Mo-lyb-den-um With Minimum Weight

IRON

Standardized Naylor Pipe is made in sizes 6" to 12" I. D. and 14" to 20" O. D. in any uniform length desired up to 40'0". Ends made to wrought pipe standards for all types of coupling.

Toncan Copper Molybdenum Iron possesses a superior corrosion resistance, making it the favored pipe material.

Where corrosion is not a problem, Naylor Pipe can be furnished in steel.

type turbine. The electric and steam power sections are housed in individual buildings connected by a piping tunnel.

The boiler house, 62 feet wide x 124 feet long x 85 feet high, is designed to accommodate three (3) 1046 h.p. Stirling type B. & W. boilers, together with all auxiliary equipment. At present, however, only two units are installed. These have a design pressure of 450 pounds and are being operated at 400 pounds Ga. Steam from the drums is led through a Cochrane Purifier before going to the superheater where it is superheated 100 degrees F. The boiler units are also equipped with a Cochrane continuous blow-down system which has a capacity up to 75,000 pounds per hour of make-up, and make-up water is furnished through a Cochrane hot process softener.

Unit Type of Firing

The installation is of the unit type of firing, one Fuller-Bonnet ball mill of 10,000 pounds per hour capacity being used to supply each boiler. Combustion within the Bailey water-cooled furnaces is very complete due to the thorough mixing of pulverized coal and air which has been passed through a Babcock-Wilcox vertical tube type preheater. A Bailey automatic control system installed on each boiler completes a very modern plant, and over-all thermal efficiencies as high as 83.3 per cent have already been obtained.

Located in a building 60 x 90 feet in length, the turbine room is 35 feet high, plastered throughout and has a true elliptical ceiling in which all lighting fixtures are concealed. The turbo-generator, switchboard, three M. G. sets and jet air pumps are located on the main floor and all additional equipment is concealed in the basement or ground floor level.

The prime-mover, a 4375 KVA pounds Ga. and supplies type turbo-generator, operates on a pressure of 375 pounds Ga. and supplies automatic extraction at 15 pounds Ga. for process. A back pressure of 28 inches Hg. is maintained. The alternator running at 3600 R.P.M. generates at 2300 volts, but lower voltages where required in the plant are supplied through a bank of transformers. A second bank of transformers is used in a high tension tie line, connecting the new turbine room with that in the other mill, which enables either plant to furnish power to the other, or both plants to run in parallel and exchange power.

Two (2) 150 K. W. MG sets serve for excitation and a third of 300 K. W. capacity is used for mill service. The hook-up is so arranged, however, that any of the three may be connected to either mill service or to the excitation bases. The 300 K. W. set is driven by a synchronous motor and the others may be either motor or turbine driven.

Space has been provided in the turbine room for the installation of a second turbo-generator when needed.

Hayton Pump Installation

The stock chest agitation on equipment at Mead Straw Pulp Company, Chillicothe, Ohio, consists of Hayton Pump and Blower Company Pump Type Agitators. Eight of these agitator pumps have been installed in this mill, one being the No. 14 size with a capacity of 3000 G. P. M., and the other seven being the No. 12 size with capacities of 2000 G. P. M. each.

The No. 14 agitator is connected to a flat bottom, rectangular chest 34 feet long by 13 feet wide by 6 feet deep which contains 8 per cent straw stock. There is a midfeather through the center of the chest, and the agitator pump keeps the stock mixed up and circulating around this midfeather. A 20 hp. motor is used, although the horse-power required amounts to only 15 hp.

One of the No. 12 agitators is connected to a vertical round chest fifteen feet in diameter by 12 feet high, and containing 3 per cent straw stock, with two midfeathers around which the stock circulates. Another No. 12 pump is connected to a flat bottom, rectangular chest 12 feet by 12 feet by 10 feet, containing 3 per cent straw stock. The other five pumps are connected to flat bottom, rectangular chests varying in capacity from 18,600 to 30,000 gallons, and containing 4 to 4½ per cent stock. Each chest has a central midfeather for the stock to flow around and each pump is driven by a 10 hp. motor.

The agitator pump used, as described above, is a low head, large capacity pump with a screw type impeller, which has been developed by the Hayton Pump and Blower Company, Apleton, Wis., for use on agitation and other low head work.

Chromium Plating in the Paper Industry

Experience with many highly successful applications of chromium plating on paper mill machinery and equipment has quite naturally developed a steadily growing interest in the use of chromium as a protection against wear and corrosion. The most important characteristic of chromium is its hardness—it is much harder than any other commercial metal and almost as hard as the diamond. This characteristic coupled with the ability to chromium plate practically all base metals has made chromium plate an exceptionally ideal means of resisting abrasive and corrosive action. Due to the extreme smoothness of chromium plated surfaces the wear on parts coming in contact with such surfaces is also materially reduced.

The most successful and probably the most common applications of chromium in the paper industry are on rolls, especially copper, brass, bronze, chilled iron and steel rolls. These rolls are used for various purposes: printing rolls, calender rolls, embossing rolls, press rolls, drying rolls and many others have in actual operation made enviable production records. The application of chromium plate to the surface of a roll does not damage it in any way but on the contrary, in the case of finely engraved copper printing rolls where the design is of the utmost importance, it has been found that chromium accentuates the design, giving finer and clearer printing qualities. It is not at all unusual for chromium plated copper printing rolls to produce six times as much as unplated rolls. Of no small importance is the ability of chromium plated rolls to resist corrosion and pitting, whether the rolls are constantly in use or in storage The smooth, true surface is permanent and the only cleaning required is simply to wipe the surface with a damp cloth.

In the case of copper engraved printing rolls used for long runs not only can the life of the roll be increased many times over but when the printed impression shows the least indication of roll wear, the roll may be removed, stripped and replated at a comparatively small expense. This affords substantial economy compared to the cost of expensive re-engraving and lost time in operation. Because of the smoothness of the chromium the material has no tendency to adhere. Since chromium resists practically all acids it is successfully used even in contact with otherwise highly corrosive solutions.

The enormous benefits of chromium plate are by no means confined to any one industry but more experience is available regarding chromium plated paper equipment than in most other lines of industry. Because of the large and heavy equipment used it has been found necessary to have special facilities for plating it and therefore comparatively few commercial plating plants are equipped to handle these parts. It should be emphasized that chromium plating as applied to resist wear and corrosion is entirely different from the ordinary bright plating for decorative purposes. The larger and more progressive chromium plating plants which have already gained valuable experience along these lines have perfected methods which, in conjunction with skilled technical supervision, have produced excellent results. The potential economies afforded by the application of chromium plating to mechanical equipment are still appreciated by only a comparatively few organizations but these few are almost unanimously enthusiastic.

The Chromium Corporation of America, 120 Broadway, New York will on request supply additional information regarding the application of chromium plating in the paper industry.

Among the many KELLOGG units serving the Brown Paper Mill

are 16 Kellogg Tumbling Digesters

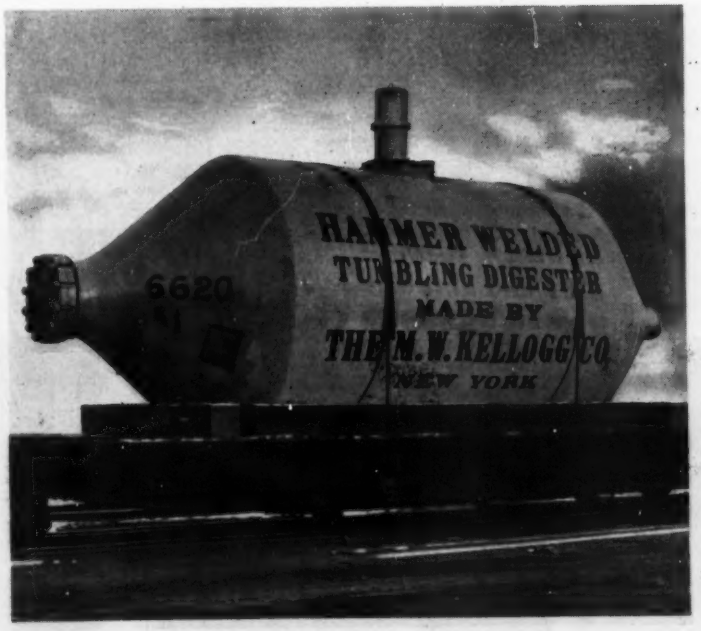
TWENTY-EIGHT boiler drums, sixteen digesters, and two receiver type distributing headers, all fabricated by the Kellogg, Forge and Hammer Lap Welding method, are serving the Brown Paper Mill Co., Inc., Monroe, Louisiana. In addition, all piping throughout the recent extension of this modern plant was furnished and erected by Kellogg.

Among this total of 46 Kellogg pressure vessels are 9 *Positive Center* Type Tumbling Digesters, the first ever fabricated. In the Kellogg *Positive Center* Digester there is no possibility of shaft deflection. Gearing and drive troubles due to this cause are avoided.

In the Brown Paper Mill, as elsewhere, Kellogg quality equipment provides greater operating economy, efficiency and safety, and assures lowest cost production per ton of high grade pulp.

THE M. W. KELLOGG COMPANY
225 BROADWAY, NEW YORK

Birmingham, 827 Brown-Marx Building; Boston, 12 Pearl Street; Chicago, 1 La Salle Street; Pittsburgh, Oliver Building; Los Angeles, 742 Western Pacific Building; Tulsa, Philtower Bldg.



One of 9 Kellogg Forge and Hammer Lap Welded Positive Center Tumbling Digesters built for the Brown Paper Mill Co., Inc., Monroe, La. Seven other types of Kellogg Tumbling Digesters are serving this plant.

KELLOGG

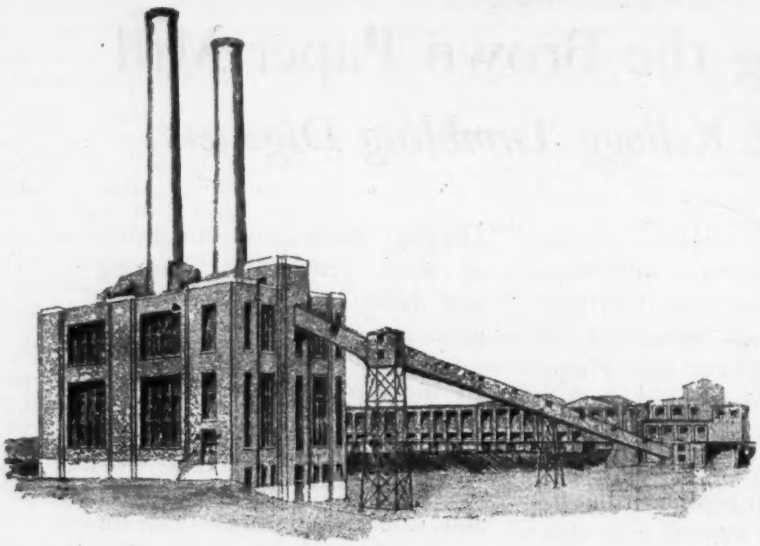
WELDED BOILER DRUMS...RECEIVERS...SEPARATORS...HEADERS...COMPLETE POWER PLANT PIPING...ALL KELLOGG WELDED PRODUCTS ARE INSURABLE

Oxford Paper Mill Thoroughly Modernized

New Bleaching System First of Type Installed In U. S. — Boiler House, Capable of Further Expansion, Nears Completion—Will Provide For Immediate Needs of Plant — New Structure For Research and Engineering Departments

DURING the past year or two the Oxford Paper Company has instituted many improvements in its policy of modernizing its plant and equipment for securing improved quality of product and increased efficiency of operation.

A new pulp bleaching system of the Thorne type has been installed; a soda brown stock washing system using Oliver filters is in operation. Morterud circulators have been installed on the soda digester for improved quality of soda pulp. Paper machines have been rebuilt and improved to give better quality and improved efficiency of operation. In addition to the above, the Research and Engineering building has been built and equipped and a new Boiler House is nearing completion.



NEW BOILER PLANT OF OXFORD PAPER CO., AT RUMFORD, ME.

Thorne Bleaching System Installed

The Thorne Bleaching System is the first of its type to be installed in the United States. Capacity is provided for two hundred and fifty tons of soda pulp and one hundred and twenty-five of sulphite pulp per day. The particular novelty of the Thorne system of bleaching is that the pulp is bleached at densities from sixteen to twenty per cent in two stages without agitation during bleaching. Bleaching temperatures range from 25 degrees to 28 degrees centigrade.

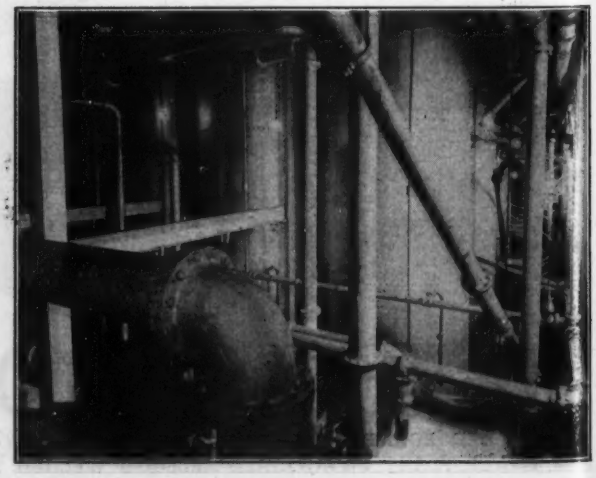
The unbleached stock coming to the system is thickened on Oliver thickeners to densities ranging up to twenty-four per cent. The thickened stock is mixed with bleach liquor and shredded fine in a special shredder that discharges the finely shredded pulp into a tower. The tower is approximately nine feet in diameter and thirty feet tall and is lined with smooth glazed white tile.

After passing through the first stage tower the stock is diluted and again thickened and washed and introduced into the second stage towers with a second portion of bleach liquor and a second shredding and mixing. To provide for increased time of reaction the second stage consists of two towers instead of one. Upon leaving the second stage towers the fully bleached pulp is washed free from bleach residues and delivered to the paper mill. The entire plant contains eleven Oliver thickeners and washers and nine bleach towers with the necessary pumps, etc.

Old Washing System Eliminated

The Soda brown stock washing equipment has eliminated the old system of washing in open pans. The open wash pans have become simply blow tanks or liquor storage wells. In the operation of the system the digesters are blown into cyclones that discharge the pulp and liquor into blow tanks equipped with a single short arm agitator. From these tanks the pulp and black

THORNE BLEACH PLANT OPERATING LEVEL

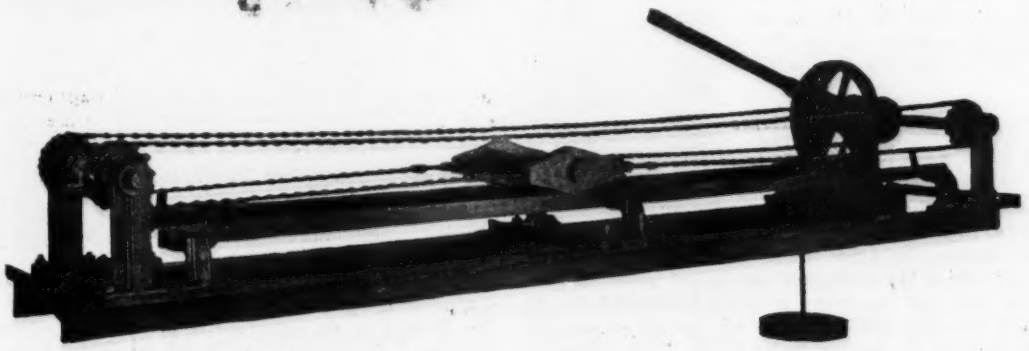


THORNE BLEACH PLANT FROM LOWER FLOOR

ANNOUNCING

TREMPE'S IMPROVED AUTOMATIC FELT TIGHTENER

The Tightener of Simplified Accuracy



Consists of a felt stretch roll supported at each end by a movable frame riding on parallel guides. The guides are suitably fastened to the bed plates and allow the frames to carry by the ends of the dryers inside of the machine frame. These movable frames, supporting the felt stretch roll, are kept in perfect alignment by endless chains placed over sprockets keyed to a common shaft. A wire cable, wrapped about a sheave keyed to the same shaft and carried to any convenient location, supports the weight needed for any required tension. The guide strips and cable allow for a variation of twenty feet in the length of the felt and automatic uniformity of tension, all without any personal attention whatever. Hand and all other stretches are dispensed with.

INCREASES FELT LIFE 10 TO 30%

SAVES STEAM, PAPER, TIME, LABOR AND JOURNAL BEARINGS

OVERCOMES FELT TRAVELLING AND SUDDEN OR UNDESIRABLE FELT STRAINS

ELIMINATES COCKLING AND CURLING

MOREY PAPER MILL SUPPLY COMPANY

38 CHAUNCY ST. BOSTON, MASS.

liquor are pumped to Oliver washers. The black liquor and hot wash water are stored for evaporation and the washed pulp discharged to the screens.

Research and Engineering Building

The new Research and Engineering building provides suitable accommodation for the growing activities of these departments. The building is a five story structure with 17,000 sq. ft. of floor area. The lower floor is devoted entirely to the machinery and equipment for semi-commercial studies. There is housed here complete equipment for pulping, bleaching, refining, screening, etc., and all of the ordinary processes common to the industry. The second and third floors provide small scale laboratories and general laboratories for pulp and paper mill research as well as offices and library. The fourth floor of the building is shared with the Paper Inspection Department and the fifth floor is occupied by the Engineering Department and is modern in every sense of the word. Complete facilities have been provided for the study of raw materials entering into the high grade paper that has always been characteristic of the Oxford lines as well as full facilities for the study and inspection of the finished paper product.

RESEARCH BUILDING

New Boiler House

The new boiler house is a fireproof brick building with a steel skeleton framework, having a concrete roof. This building is approximately 97 feet long by 121 feet wide and 85 feet high and has three main floors and two skeleton floors.

There is a monitor the whole length of the building extending 12 feet either side of the center line and 11 feet above the roof which houses the coal conveyor A brick chimney 12 feet in diameter and extending 207 feet above the ground is superimposed upon the roof of the new boiler house. It is interesting to note that the column's load, due to the chimney, is approximately 690 tons.

The Oxford Paper Company is installing two 1200 h.p. Sterling boilers manufactured by the Babcock & Wilcox Company. These boilers are built for 450 pounds working steam pressure and it is proposed to operate these boilers at 175 pounds pressure for the time being. The ultimate capacity of the plant will be four boilers.

The furnaces surrounding these boilers are made up of water walls on the two sides, rear and the upper part of the front walls. The dimensions of the furnace enclosure under the bottom mud drum are 18 feet inside the side walls with a height of 25 feet. If the furnaces were partitioned off into two stories, the resulting dimension would represent two spacious living rooms.

The economizer, the function of which is to heat the water as hot as possible before entering the boiler, is made up of two-inch steel tubes with a series of cast iron gilled rings on the outside of each tube. The economizer contains 3024 square feet of heating surface and is built for 550 pounds working pressure.

Efficient Superheater Installed

The superheater which is built into the boilers is of sufficient capacity to superheat the steam 50 degrees when the boilers are operating at 175 pounds pressure.

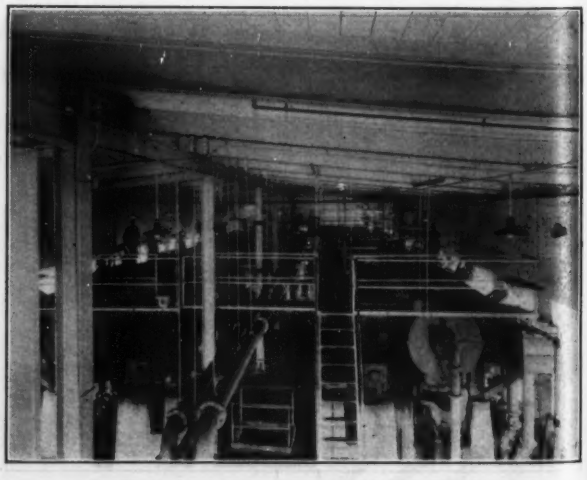
There are two coal pulverizers to each boiler. Each machine will pulverize 10,000 pounds of coal per hour. On the same shaft directly back of the pulverizer is an exhauster which draws the mixture of air and pulverized coal from the pulverizer and blows this mixture into the burners and thence into the furnaces. Each pulverizer will be driven by a 150 h.p. direct connected squirrel cage motor. The water wall furnaces, economizers, superheaters, and pulverizers are furnishesd by the Foster-Wheeler Corporation.

The ashes resulting from the combustion of the pulverized coal will drop into the bottom of the furnace where they will be sluiced out by a water pressure system known as the hydrojet system, furnished by the Allen, Sherman, Hoff Company.

Tubular Type Air Heaters

The air heaters are the tubular type and are made up of two and one half inch steel tubes and contain 13,200 square feet of heating surface. The function of the air heaters is to preheat cold air by taking the cold air on the outside of the tubes and flue gas on the inside of the tubes. It is necessary to have pre-

BROWN STOCK WASHERS



THORNE BLEACH PLANT SHOWING OLIVER THICKENERS

Eight days then

. . . less than 30 hours now!

IN 1858 when Asa Shuler and J. W. Benninghofen formed a partnership for the manufacture of paper making felts, the first overland mail left St. Joseph, Mo., for San Francisco.

Eight days were required for the trip. Today we mark a letter "Air Mail" in New York City . . . 1100 miles farther East . . . and 30 hours later it is delivered.

Wonderful as this advance is, it is no greater than the advances that have been made in the weaving of felts by the sons and grandsons of Shuler and Benninghofen.

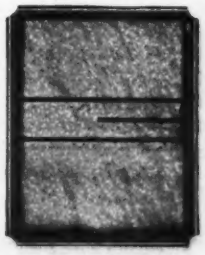
Because of the 72 years of experience that is put into every Hamilton Felt, it takes out water in more than usual quantities, it lasts longer with a minimum down time for washing, it produces a better sheet of paper and it cuts both felt and paper costs.

Try one Hamilton Felt, you'll buy another and another and another. Your obligation to your stockholders will permit you to use nothing else.

Shuler & Benninghofen *Hamilton, Ohio*

Miami Woolen Mills

Established 1858



Hamilton Felts are marked by two blue lines full width of the felt and by one shorter blue line midway between them.

Hamilton Felts

heated air in the modern pulverized fuel boiler plant to assist combustion and to assist the pulverizers to handle wet coal.

The induced draft fans drawing the flue gas from the air heater are capable of handling 93,300 cubic feet per minute of flue gas, which corresponds to 108 tons of gas per hour. The induced draft fan will be driven by a direct connected 300 h.p. Slip Ring motor furnished by the General Electric Company. The forced draft fans will be capable of handling 58,800 cubic feet of air per minute which corresponds to 103 tons of material per hour. Each fan will be driven by a Terry Steam Turbine. The air heaters, forced and induced draft fans are furnished by the Green Fuel Economizer Company.

All the pumps that will be used in the new boiler plant have been furnished by the Ingersoll-Rand Company. The boiler feed pumps are of special interest in that they are four stage pumps. There are three of these pumps; each pump is capable of delivering 530 gallons of water per minute against a head of 575 pounds per square inch, but will operate at 225 pounds pressure for the time being. These pumps will be driven by Terry Steam Turbines and will supply all boiler feed water for the present plant as well as the new plant.

System of Coal Unloading

The system of coal unloading and reclaiming conveyors located under the coal piles, elevators and crushers will be the same as at present. From the crushers in the coal handling house the coal crushed to an inch and a half size will be fed by gravity two ways, one part going to the hopper feeding the coal conveyor system serving the present boiler house. The other part will be delivered through suitable chutes to a short inclined belt located in the present coal handling house.

This conveyor will feed a second conveyor which in turn will feed a third conveyor which in turn discharges into a overhead suspended bunker. This bunker is a steel catenary bunker supported by the building steel and holds approximately 1,000 tons of coal. The conveyor system can handle up to 150 tons of coal per hour. The coal conveying equipment is furnished by the Stevens Adamson Company.

Sand Filters To Be Used

In the modern boiler plant practice with high ratings it is necessary to obtain the best possible water and for that reason the company will use sand filters to remove the oil and other impurities from the condensate returning from the mill system. The makeup water from Swift River will receive the Hall system of boiler feed treatment.

All water passes to the deaerating heater, the function of which is to remove all entrained air from the water before passing to the boilers. The filters are furnished by the Cochrane Corporation and the heater by the Hoppes Manufacturing Company. Boiler feed treatment is furnished by the Hall Laboratories.

An automatic combustion control, the function of which is to automatically regulate the coal feed to the burners as well as the air supply for complete combustion is furnished by the Leeds & Northrup Company.

The new installations include nine Morterud Circulating Systems in the mill, and one Morterud Circulating System for experimental digesters in the new laboratory.

In addition to the above, many other minor improvements have been provided such as broke handling systems, bleaching and Jordoning equipment, pulp washing and white water systems to provide Oxford with the last word in pulp and paper mill equipment.

Longer Life for Blow Pit Bottoms

One ideal held constantly in mind of the sulphite mills is sistent with good business practice. In solving this problem to effect as complete utilization of the pulp fiber as is consistent with good practice. In solving this problem there were a number of definite requirements to meet, such as saving of fiber, uniform fast drainage and the replacing of the old-style drilled wooden and tile drainer blocks which have long been a source of costly troubles. These troubles were solved with the Perforated Allegheny Metal Drainer Sheets for use in blow pit bottoms, which are furnished by the Nortmann-Duffke Company, Milwaukee, Wis. The sheets are made of Allegheny metal, which is non-corrosive and is not effected by the hot sulphite liquors.

Allegheny metal is a super corrosion resisting alloy. The metal is said by the manufacturers to be the most corrosion resisting ferrous alloy which has yet been offered in commercial quantities, and the large and ever increasing use of Allegheny metal in the manufacture of hotel, restaurant, hospital and dairy equipment, including all of the various utensils required in these highly developed industries is assurance of the adaptability of Allegheny metal to all forms and conditions of construction.

The Perforated Allegheny Metal Drainer Bottoms make practically a permanent installation, and have the following advantages over the old-style tile or wood blocks: the sheets do not become clogged, there are more holes per square foot which give faster drainage, the fiber loss is greatly reduced, there is no danger of the sheets becoming loose as is sometimes experienced with the wood or tile blocks thereby causing large fiber loss, the material will not chip off, it is easy to clean and never needs any replacements.

Owing to the method of fabricating and heat treating this material, it is meeting with great success in the sulphite mills, and in fact the first installation which was made over three years ago shows no wear from corrosion, and looks just as good today as the day it was installed.

In fabricating chrome nickel perforated sheets to withstand the hot sulphite liquors great care must be taken so that no crystallization of the metal takes place and that they are properly heat treated, for when this is not done the metal breaks down in a very short time and the bottom goes to pieces. This condition has been overcome by making special dies, tools, punches, etc., for handling the material to make the bottoms last indefinitely.

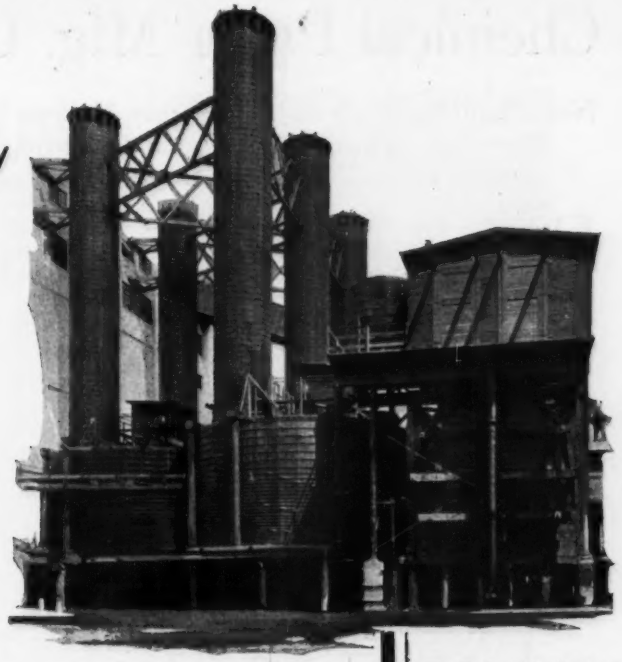
Cheney Pulp Mill Holds Unique Distinction

The Cheney Pulp and Paper Company at Franklin, Ohio, holds a rather unique position in the manufacturing world today. It is the only mill manufacturing rag pulp in the United States. This business was started in 1912 when Alfred A. and Harry Srere, operating a partnership under the name of Srere Bros. Co., purchased the old Orebaugh flour mill on South Anderson street and began making cotton rag pulp from old rags. The business gradually expanded beyond the experimental stage, and new grades, such as jute, cotton linter and filtermasse pulps were added.

In 1924, Howard L. Cheney, who had been general manager of Srere Bros. Co. for about ten years, bought out the Srere interests, and at once began making extensive improvements. Cement floors were laid throughout the entire structure. Ventilators were installed. A complete filtering system was added. The old engines were discarded and the entire plant electrified. Three high speed beaters were built, and all the old belt drives replaced with texropes. The installation of an up to date sprinkler system assures adequate fire protection, and the recent acquisition of Bird Centrifiners makes this one of the most modern plants in the valley.

Employees are protected under the group life insurance plan of the Travelers Insurance Company. Well equipped rest rooms and lunch rooms are provided for the workers. The installation of a Morton Suggestion System, under which employees are urged to make suggestions which will earn them awards if it is found practical to adopt such suggestions, gives each man and woman in the employ of the company a personal interest.

no more — BLOW PIT *troubles*

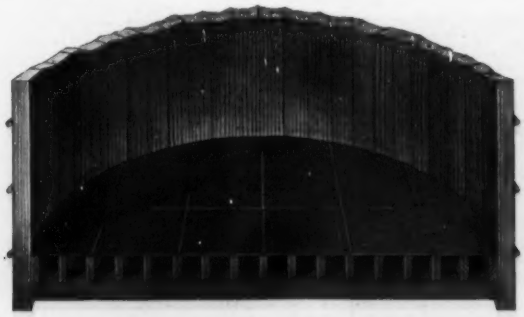


"Blow Pit Drainer Bottoms made of your Perforated Allegheny Metal show no wear or corrosion after 3 years of constant service, says a prominent Sulphite Paper Mill owner."

"Never lost a minute's time for repairs, during three years' use of your Perforated Allegheny Metal Drainer Bottoms, writes another."

Every corrosive action you will find in handling sulphite liquors leaves Allegheny Metal unaffected. This bright unplated alloy has undergone exhaustive tests in laboratories and in Paper Mills, it has proved the better metal for blow pit equipment.

Our Perforated Allegheny Metal Drainer Bottoms resist corrosion of the hot sulphite liquors, and greatly reduce maintenance costs, they give uniform and fast drainage, do not become clogged and there is no danger of the sheets becoming loose or chipping off as do drainer bottoms made of wood or tile.



TYPICAL INSTALLATION OF PERFORATED DRAINER BOTTOM

The Perforated Allegheny Metal Drainer Bottoms that we have been supplying to the Paper and Pulp Mills are without exception outstandingly good as is proved by the large percentage of repeat orders after the first Perforated Drainer Bottoms have been installed.

Among our installations are:

Anglo-Newfoundland Development Company, Grand Falls, N. F.

Abitibi Power & Paper Co., Ltd., Iroquois Falls, Ont., Canada.

Badger Paper Mills, Peshtigo, Wis.

Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.

Crown-Willamette Paper Co., Camas, Wash.

Eastern Mfg. Co., Bangor, Maine.

Marathon Paper Co., Rothschild, Wis.

Munising Paper Co., Munising, Mich.

Maine Seaboard Paper Co., Bucksport, Maine.

Olympic Forest Products Co., Port Angeles, Wash.

Rhinelander Paper Co., Rhinelander, Wis.

Restigouche Co., Ltd., Campbellton, N. B., Canada.

and others

NORTMANN-DUFFKE CO.

2740 So. 32nd ST. MILWAUKEE, WISCONSIN.

Chemical Paper Mfg. Co. Builds Cylinder Mill

New Plant Houses Two Thoroughly Modern Cylinder Machines Built by Rice, Barton & Fales, Worcester, Mass. Beater Room Is Equipped With Six Dayton High Speed Beaters and Eight Jordans Direct Connected To Westinghouse Motors, Four for Each Machine

FOR over fifty years the Chemical Paper Manufacturing Company of Holyoke, Mass., has held an enviable reputation as manufacturers of high grade folding box board. Their new box board mill, completed early in 1930, is therefore of especial interest.

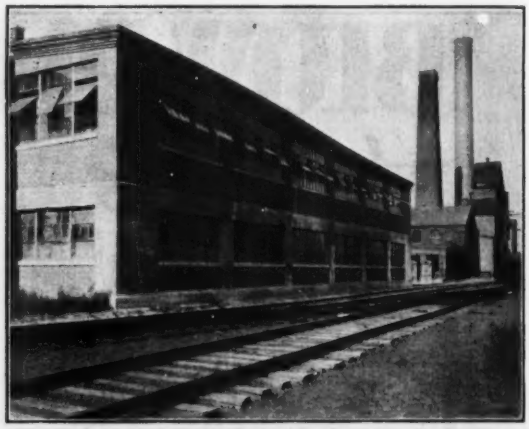
Brick and Concrete Construction

The first impression one gets of it is the very apparent suggestion that this mill was built with another fifty years service to the folding box board industry in mind. The mill is of brick and concrete throughout with a steel supported wooden roof built with treated lumber and protected with cork insulation.

Two Cylinder Machines Installed

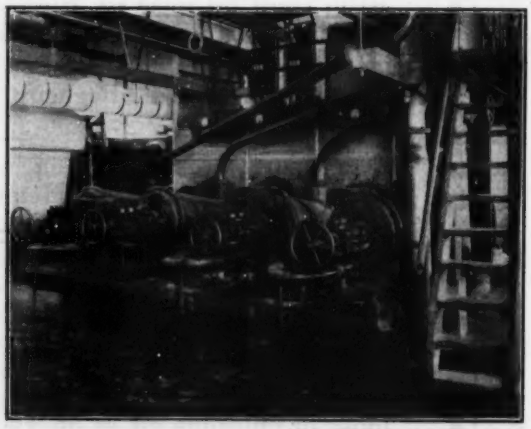
The mill houses two cylinder machines built by Rice, Barton & Fales, of Worcester. These machines are thoroughly modern, and present a striking contrast to the smaller machines used in the early history of the company.

The beater room is equipped with six Dayton high-speed beaters with cast iron tubs and concrete bottoms. In addition to these

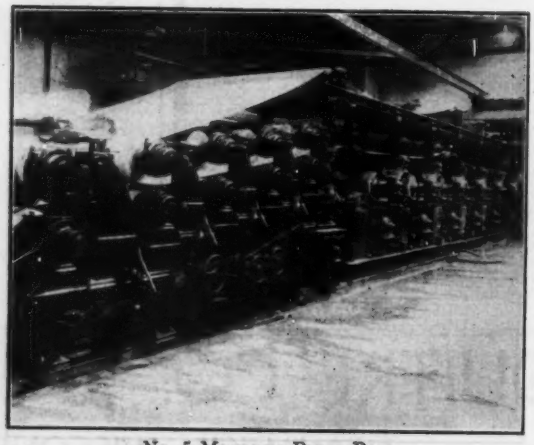


EAST END OF NEW MILL

NEW BEATER ROOM



SHOWING JORDAN ENGINES



NO. 5 MACHINE PRESS PARTS

NOS. 5 AND 6 MACHINES

.... Serving Canada's Greatest Basic Industries

Two great Canadian basic industries have outstripped all others in rate of growth during the last decade—viz., the pulp and paper and hydro-electric industries.

The important part played by Dominion Engineering Works in this growth is fully realized by the following:

One-third of Canada's newsprint is made on Dominion built newsprint machines.

56% of the hydraulic turbines installed in major hydro-electric developments during the last decade are Dominion built turbines.

DOMINION ENGINEERING Works Limited

MONTREAL CANADA

WET END OF NO. 5 MACHINE

DRY END OF NO. 5 MACHINE

there are eight Jordan engines direct connected to Westinghouse motors, four for each machine.

Older Equipment Entirely Replaced

This new mill replaces the older box board equipment of the company, which has been abandoned.

With the increased output made possible by the new mill, and the recognized leadership in the manufacture of high grade boards which has always been maintained, this company is now in a position to take the best possible care of the business entrusted to it by its large number of customers.

F. M. P. Coarse Screens Remove Impurities

The F.M.P. Coarse Screen manufactured by the Fibre-Making Processes, Inc., of 8 South Michigan Boulevard, Chicago Ill., provides an effective means of removing from the stock, at the beginning of the cycle, those impurities which with other screening methods are passed into the system to be rejected at a later step. It performs this function without loss of fine fiber. On ground wood the screen takes the place of both bull screen and knotter.

The relatively fine perforations do not pass any impurities which are objectional to the fine screens. Consequently the work of the fine screens is considerably reduced. In the F.M.P. Coarse Screen, with its gravity feed, the impurities are gently rolled, showered and rejected. No breaking action takes place.

By means of an arrangement of baffles, the rejects are propelled over a spiral path eighty feet long under a heavy spray of white water with the result that the rejects are thoroughly washed and free from good fibers.

The drive consists of a combination spur and worm gear reducer, running in oil, direct connected to the motor making a self-contained unit; no belts, countershafts or outside reducers are required.

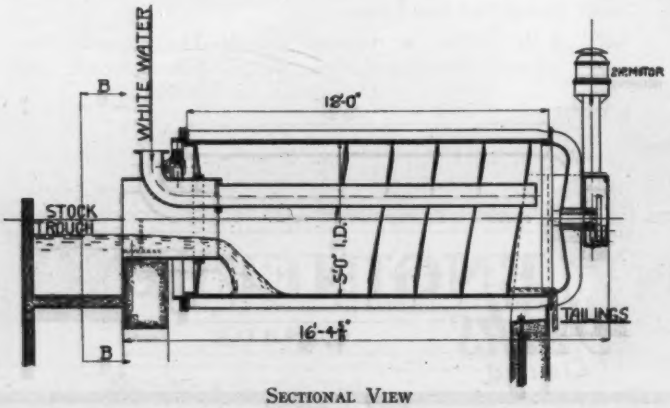
The rim-track at inlet end is suspended on supporting rollers, thus eliminating trunnions underneath, large journal, or shaft through the center. Anti-friction bearings are used throughout.

The F.M.P. Coarse Screen is built in two sizes with respective capacities of 65 and 35 tons of chemical pulp per 24 hours with ¼ inch holes. For ground wood capacities are respectively 100 and 50 tons per 24 hours with 3/16 inch holes.

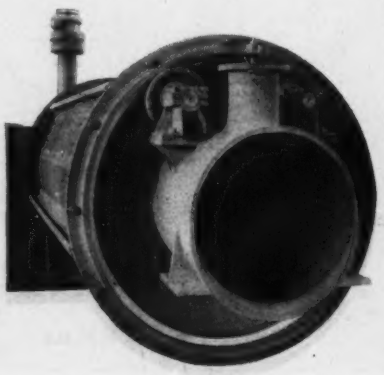
Injured Paper Mill Workers Granted Awards

[FROM OUR REGULAR CORRESPONDENT]

LOWVILLE, N. Y., October 26, 1930.—At a session of Compensation Court held this week a number of injured paper mill workers were granted awards by Judge James Richardson. An award of $2,729.79 was granted to Anthony Gapp, of Lyon Falls, who was injured while working for the Gould Paper Company. He suffered the loss of an arm and has been incapacitated from further duty for some time. W. E. Walters, an employee of the Lewis Fibre Can Corporation, Lowville, was awarded $368 for the loss of a finger while performing his duties as a machine operator and the case was ordered continued. The cases of Frank Murphy and Andrew Mathys, employees of the J. P. Lewis Company, of Beaver Falls, seeking further compensation, were ordered closed. Michael Bick, an employee of the Gould Paper Company, was awarded $168.25 for the loss of a finger and the case continued. An award of $100 was given William Bidwell, who received a facial disfigurement while working at the mill of Knowlton Brothers.



SECTIONAL VIEW



INLET END

AERFLOTED
PARAGON CLAY
'The result of intelligent research is successful achievement.'
Modern manufacturing, constant supervision, and aer-float control in refining have combined to produce a clay exceptionally free from grit and of unusual uniformity.
The brilliant white color and inherent softness of Paragon together with economical and efficient production methods have brought this product forth as a new standard among paper clays.
Samples and quotations upon request.
J.M.HUBER, Inc.
460 West 34th Street, New York
Branches in principal cities
aerfloted
PARAGON CLAY

Rhinelander Paper Co. Reconstructs Plant

Mill Has Been Modernized Throughout At A Cost of More Than $3,000,000—Rebuilding and Modernizing of the Wood Room, Which Was Started Last Month, Will Complete Program of Improvements Started Three Years Ago

DURING 1927, a complete survey was made of the large plant of the Rhinelander Paper Company at Rhinelander, Wis., with the view of mapping out a program for the modernization of the entire mill. The accepted plan called for the installation of considerable new equipment as well as the reconditioning of existing buildings and machines, and affected every department of the mill.

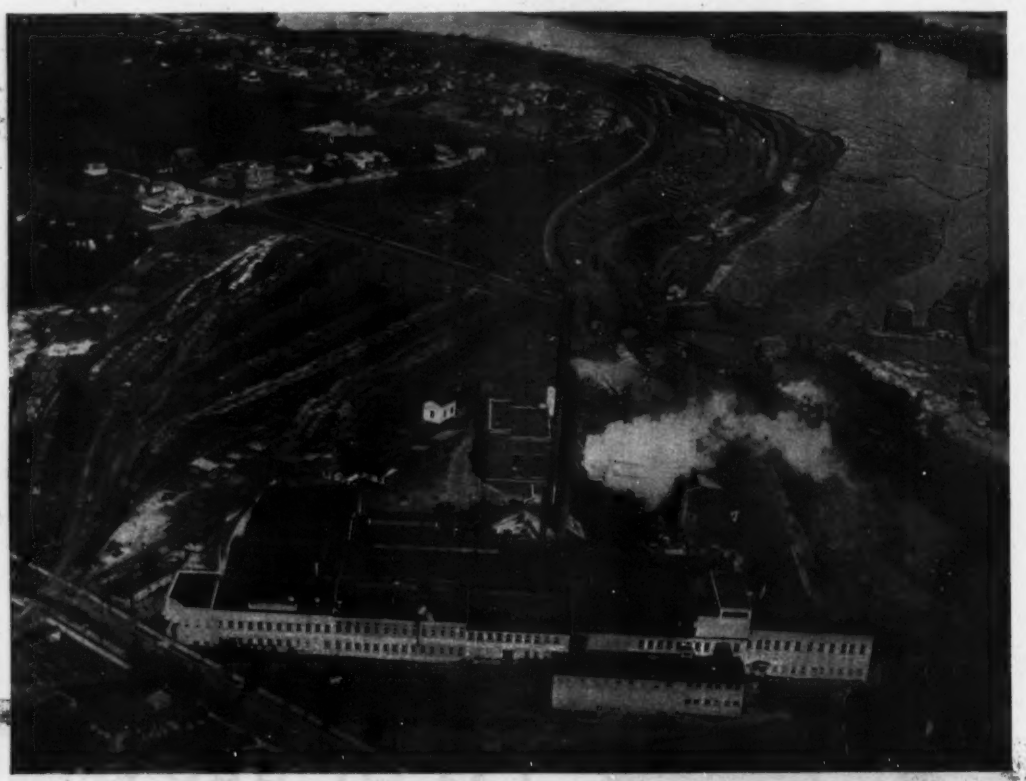
Cost to Exceed $3,000,000

Total cost of improvements, at the completion of the entire program, will have exceeded three million dollars which has been distributed over a period of three years. The last item on the list of improvements called for the rebuilding of the wood room, replacing the present wood structure with a fireproof building, and the installation of considerable modern barking equipment, as well as the reconditioning of the old machines. The new equipment includes a 12 x 44 barking drum made by Fibre Making Processes, Inc. Plans and specifications for all new work have been made by the Engineering Department of the Rhinelander Paper Company, with G. H. Suhs in charge as chief engineer.

Through the co-operation of the engineering office with the various department heads it has been possible to plan the work so as to cause the least possible interference with the operation of the mill in carrying out the many changes. The general construction work has been handled by the C. R. Meyer & Sons Construction Company, of Oshkosh, Wis. With the completion of the new wood room which was started on September 15 of this year, the entire construction program will have been carried out as originally outlined.

Paper Mill

To meet the increasing demand for Rhinelander glassine, No. 4 machine, which was a Yankee Fourdrinier, was removed to give room for a 144 inch specially designed Fourdrinier paper machine. This machine was built to make glassine, greaseproof and manifold papers, and embodies many unique features.



AIRPLANE VIEW OF THE PLANT OF RHINELANDER PAPER CO., RHINELANDER, WIS.

In connection with this installation four new supercalenders and six high density beaters, as well as considerable other equipment, were added to handle the increased output of glassine.

A large addition was also made to the finishing room to provide additional storage space for paper as well as more suitable quarters for the sheet and embossing departments.

No. 3 paper machine which was a Yankee type Fourdrinier was rebuilt to run on semi and full crepe tissues in addition to the regular line of M. G. papers.

The Fourdrinier end of Nos. 1 and 2 machines, which are both running on glassine, were remodeled and both machines equipped with new hoods, rewinders and dampeners. All beaters and Jordans in this department were discarded and replaced with equipment designed to properly prepare stock for glassine papers.

Use Our Paper Mill to Iron Out Your Production Kinks

The Noble & Wood Testing Mill —a practical **FULL SIZE** *plant— is freely at* **YOUR** *service...*

The Noble & Wood Experimental Mill has recently

Demonstrated the practicability of repulping insulated building board trim.

Run a sulphite test for a glassine manufacturer.

Equipped a jordan with stone filling for a special job, with interesting results.

Cooperated with the government in cellulose and nitro cellulose tests.

Pulped a test ton of broke for a Wisconsin mill.

Run a satisfactory test of ground wood for a building board manufacturer.

Built a special jordan for a test on leather stock, chips and shavings.

Run tests for a large camera maker.

Just the place to work out those problems you have in the back of your head but lack the time or equipment to follow through. To prove whether or not you can do "so-and-so", without tying up your mill in experimenting. To put through a batch of untried raw material to find out if it will come through as you expect. To demonstrate whether a piece of equipment will fit your mill conditions. To do a lot of the experimental work you'd like to do if you had the facilities.

It's not just a laboratory, but a fully equipped plant,—with commercial size beater, pulper, jordan, stock chest with propellers, board machine and testing devices. Originally installed to test our own products, it has broadened in scope to a valuable service medium for the paper and allied industries. You'd be surprised at some of the BIG developments in the trade that have been worked out here.

The point is,—if you're struggling with some production or equipment problem, you're missing a good bet if you don't make use of this plant. It's here for you to use,—without obligation, or fees, —and in strictest confidence if you say so. You've got nothing to risk except the time of talking it over,—and we'll match that with ours any time you say.

NOBLE & WOOD
MACHINE COMPANY
Hoosick Falls New York

To insure the utmost cleanliness in the finished sheet, all glassine machines have recently been equipped with centrifiners. This type of screen embodies the latest development in removing dirt specks from the pulp by centrifugal force, separating all foreign matter from the stock directly ahead of the paper machines.

Sulphite Mill

In this department concrete chip bins were provided in the digester room, as well as a 15-ton digester in the place of one of the smaller old units.

The operation of the acid plant was improved by securing a steady supply of well water, insuring uniform temperature of the water used for cooling and acid making. Additional cooling capacity for SO_2 gas was also provided as well as a larger sulphur burner and a more efficient recovery system.

The installation of a modern high density bleaching system and a two-stage bleach washer as well as a battery of tile lined concrete chests for the storing of the various grades of bleached and unbleached pulp in slush form, were important factors in reducing operating costs and improving quality.

The wood preparing department which is now being remodeled will be of fireproof construction throughout. It has been designed to operate with a small working force and sufficient wood will be prepared on one eight hour shift to take care of the demand of the sulphite mill.

The main barking unit will consist of a new 12 x 45 foot barking drum of the suspended type, which will be provided with a concrete vat, making it possible to operate this drum either wet or dry as conditions might demand.

A four-foot slasher for small wood, to handle lengths up to 12 feet, will be erected ahead of the new drum, and the present cut-off saw will be overhauled and equipped with a steam kicker for the loading of the log carriage.

All conveyors throughout the entire wood room will be of steel construction and provided with individual motors and push button control. The motors will be direct connected to enclosed herringbone reduction gears with roller chain drive from speed reducer to conveyor sprocket.

The old 10 x 30 foot suspended type drum which is now in operation will be rebuilt and used for a washing drum when the new unit is placed in service.

To reduce the waste of wood to a minimum, all disc type hand barkers will be discarded and the after cleaning accomplished with machines equipped with high speed cutterheads.

A modern direct connected chipper will be added and the old machine reconditioned for a spare unit. To insure uniform speed of chipper discs, synchronous motors will be installed to drive these machines.

New chip screens will be installed as well as a rescreening system for saw dust to guard against loss of wood at this point.

The entire wood room is laid out with the view of handling both rough and peeled wood with the greatest degree of economy.

Steam Power Plant

To meet the increasing demand for both steam and electric power as well as reduce operating costs, a modern power plant was built during 1929 at an expense of over a half million dollars. The main units of this plant consist of two 834 hp. Sterling type boilers, equipped with automatic stokers and designed for a working pressure of 400 lbs., and a 5000 K.W. extraction type steam turbine. The water wall construction used in the boiler furnaces makes it possible to carry a continuous load of 400 per cent of normal boiler rating.

The generating unit is large enough to carry the entire mill load at low water stages. Steam is extracted from this machine at 125 lbs. pressure to be used for cooking sulphite and operating several small steam engines in the mill, and at 15 lbs. pressure for the mill heating system, as well as for drying paper. A detailed account of this plant was published in a previous number of this paper.

Water Power and Electrification

In connection with these changes the complete electrification of the entire mill was also accomplished.

A number of old water wheels transmitting the power to various machines through belts were dismantled, and the water which was made available through this change was utilized in a new turbine direct connected to a 1200 K.W. generator.

Individual motors were also installed on practically every machine in the mill and speed reduction, wherever it was necessary, was accomplished through enclosed speed reducers, eliminating as much as possible open gears.

Water Filtration

To make the mill independent of seasonal changes and to insure a constant supply of clean water of a uniform color, a filtration plant was erected at a cost of $150,000. In this plant the raw water is treated with alum to flocculate the impurities and coloring matter and also with chlorine to destroy all bacteria. After passing through a settling tank the treated water is filtered through sand beds where the precipitated impurities are removed.

A central pumping station was built in connection with this plant, as well as a complete new piping system for filtered water throughout the entire mill.

Administrative Building

To bring together the various mill offices, scattered throughout the plant, a new building was erected to provide suitable quarters for the many functions in connection with the operation of the mill. In this building are the offices of the mill superintendent, sulphite superintendent, engineering department, chemical department, first aid room, time office and time clock room.

Quarters were also provided for foremen's meetings and a part of the building was set aside for a new roll grinder of the latest design.

When the policy was formulated for the reconstruction work, a contest was launched among the employees to find a suitable slogan in connection with the marketing of the product of the mill. "Consistently Good" was accepted and awarded the winning prize, and with this slogan in view the management of the Rhinelander Paper Company has spared no effort to place the mill in a position to live up to its motto at all times and constantly improve on its product.

With an increasing demand for Rhinelander glassine as well as for the other lines of paper made at this plant, including greaseproof, manifold, tissue, both plain and creped, and others, the Rhinelander Paper Company has enjoyed a good business and given steady work to a force of 400 employees.

Newsprint Institute Appoints Secretary

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., October 25, 1930.—The announcement is made that W. H. O'Reilly has been appointed permanent secretary and chief executive officer of the Newsprint Institute of Canada, to fill the vacancy caused by the death of the late Percy B. Wilson. Mr. O'Reilly has been associated with the organization since its inception. Nothing definite appears to have been done regarding the appointment of a new president, and there is no confirmation of current rumors that George H. Mead, chairman of the board of Abitibi Power and Paper Company, has consented to accept the office. One paper here states that the resignation of Col. John H. Price, of Price Brothers & Co., has been accepted; another states that it has not been officially accepted. The correct version appears to be that no action has yet been taken.

Meanwhile news print executives have been conferring in Montreal, presumably on the questions involved in the possible large merger so often reported to be the subject of negotiations, but there is nothing definite to give out, though long articles on the pros and cons of merger rumors continue to feature newspaper comment in regard to the industry.

Most leading mills *rely on Hytors*

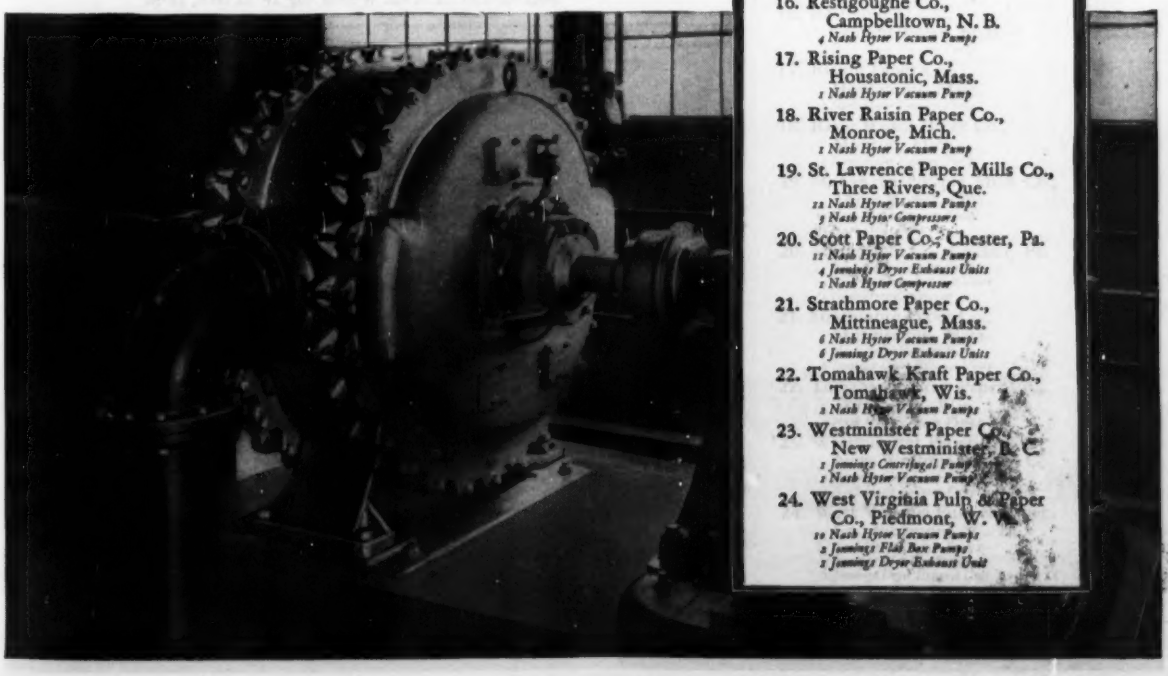
THE confidence which paper manufacturers place in Nash Hytor Vacuum pumps, and other Nash paper mill equipment is clearly evident in the number of mills which are Nash-equipped.

Among the prominent plants described in this issue of Paper Trade Journal in which Nash equipment is installed are those in the accompanying list.

While the installations listed comprise but a fraction of the total number of mills using Hytors, they indicate clearly the vital part which these reliable vacuum pumps play in the industry. The Nash Engineering Co., 164 Wilson Road, South Norwalk, Conn.

Nash Hytor
VACUUM PUMPS AND COMPRESSORS

Nash Hytor Vacuum Pumps are furnished in capacities up to 5000 cu. ft. per min. of air at 20 inch vacuum.



1. Brown Mill Paper Co., Monroe, La.
   13 Nash Hytor Vacuum Pumps
   2 Jennings Flat Box Pumps
   2 Jennings Centrifugal Pumps
   1 Jennings Dryer Exhaust Unit
2. Cellulose Products Inc., Shamokin, Pa.
   1 Nash Hytor Vacuum Pump
3. Crocker McElwain Co., Holyoke, Mass.
   2 Nash Hytor Vacuum Pumps
4. Crystal Tissue Co., Middletown, Ohio
   9 Nash Hytor Vacuum Pumps
5. Escanaba Paper Co., Escanaba, Mich.
   10 Nash Hytor Vacuum Pumps
   2 Jennings Centrifugal Pumps
6. Fir Tex Insulating Board Co., St. Helens, Ore.
   3 Nash Hytor Vacuum Pumps
7. P. H. Glatfelter Co., Spring Grove, Pa.
   13 Nash Hytor Vacuum Pumps
   2 Nash Hytor Compressors
   2 Jennings Dryer Exhaust Units
8. Hinde & Dauch Paper Co., Toronto, Ont.
   2 Nash Hytor Vacuum Pumps
9. International Paper Co., Mobile, Ala.
   4 Nash Hytor Vacuum Pumps
10. International Paper Co., Dalhousie, N. B.
    4 Nash Hytor Vacuum Pumps
11. Maine Seabord Paper Co., Bucksport, Me.
    6 Nash Hytor Vacuum Pumps
    2 Jennings Flat Box Pumps
    2 Jennings Dryer Exhaust Units
12. Mead Straw Pulp Co., Chillicothe, Ohio
    6 Nash Hytor Vacuum Pumps
    1 Jennings Centrifugal Pump
13. Oxford Paper Co., Rumford, Me.
    18 Nash Hytor Vacuum Pumps
    1 Jennings Condensation Pump
14. Powell River Co., Ltd., Powell River, B. C.
    11 Nash Hytor Vacuum Pumps
    2 Jennings Flat Box Pumps
15. Puget Sound Pulp & Timber Co., Everett, Wash.
    4 Nash Hytor Vacuum Pumps
16. Restigoughe Co., Campbelltown, N. B.
    4 Nash Hytor Vacuum Pumps
17. Rising Paper Co., Housatonic, Mass.
    1 Nash Hytor Vacuum Pump
18. River Raisin Paper Co., Monroe, Mich.
    1 Nash Hytor Vacuum Pump
19. St. Lawrence Paper Mills Co., Three Rivers, Que.
    12 Nash Hytor Vacuum Pumps
    3 Nash Hytor Compressors
20. Scott Paper Co., Chester, Pa.
    11 Nash Hytor Vacuum Pumps
    4 Jennings Dryer Exhaust Units
    1 Nash Hytor Compressor
21. Strathmore Paper Co., Mittineague, Mass.
    6 Nash Hytor Vacuum Pumps
    6 Jennings Dryer Exhaust Units
22. Tomahawk Kraft Paper Co., Tomahawk, Wis.
    2 Nash Hytor Vacuum Pumps
23. Westminister Paper Co., New Westminister, B. C.
    2 Jennings Centrifugal Pumps
    1 Nash Hytor Vacuum Pump
24. West Virginia Pulp & Paper Co., Piedmont, W. Va.
    10 Nash Hytor Vacuum Pumps
    2 Jennings Flat Box Pumps
    2 Jennings Dryer Exhaust Unit

Becomes Largest Sulphate Mill In The World

Brown Paper Mill Co. Adds 178-Inch Fourdrinier and 178-Inch Cylinder Machines to Its Already Finely Equipped Plant at Monroe, La., and Steps Up Capacity to 150,000 Tons Annually of Exclusively Sulphate Paper Products

THE largest sulphate pulp, board and paper mill in the world, located at Monroe, La., representing an investment of $15,000,000.00 and owned and operated by the Brown Paper Mill Company, Inc., is now in full operation.

Company Is Unusually Successful

The history of this company is phenomenal. Starting in September, 1924, with one Fourdrinier machine, the demand for its product became so great as to necessitate the installation of a second machine in 1927.

Third Fourdrinier and Cylinder Added

Again in August of this year a third Fourdrinier was put into operation, followed by a fourth, or Cylinder machine, in September.

As stated, the four machines are now in regular production and producing Sulphate Wrapping, Bag and Linerboard at the rate of 150,000 tons annually.

Largest Cylinder Machine

The three Fourdriniers have 178 inch width wires and the cylinder molds of the board machine are likewise 178 inches wide, this being the largest Cylinder machine in existence.

This company was the first to realize the possibilities of Fourdrinier Board for Test Liners and was the pioneer in this grade of board for the Container Industry.

Sulphate Products Exclusively

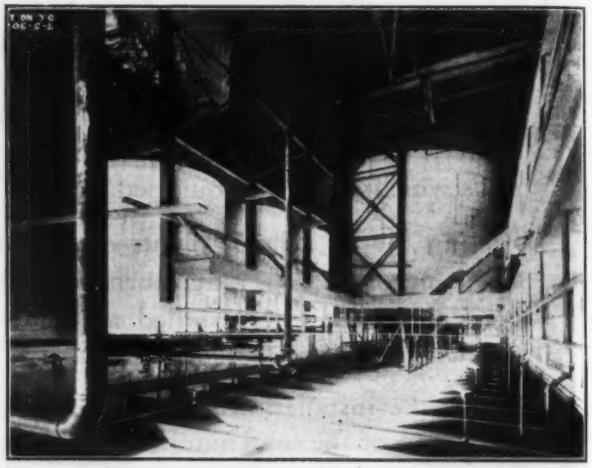
The pulp mill was designed for the production of sulphate pulp only and all products are manufactured of such pulp exclusively.

The present equipment does not contemplate the use of ground wood or waste papers in any of its products.

There is no beater room, the pulp moving by continuous process from the digesters through the Jordans to the machines.

300,000 Acres of Short Leaf Pine

The company owns outright more than 300,000 acres of Shortleaf Pine and is insured a perpetual supply of wood.



SERIES OF DORR AGITATORS AND THICKENERS USED IN THE CONTINUOUS CAUSTICIZING PLANT

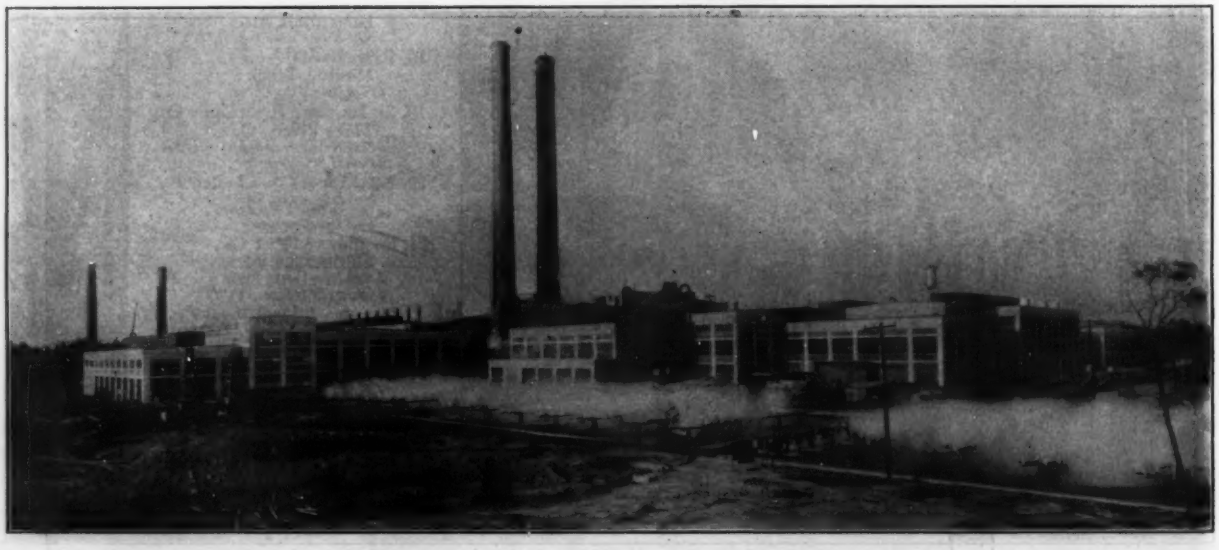
The Brown, Monroe & Southern Railway, built and owned by the company, carries the pulp wood from the timber lands to the mill and likewise delivers the finished product to the neighboring trunk lines.

Ideally Located for Paper Manufacture

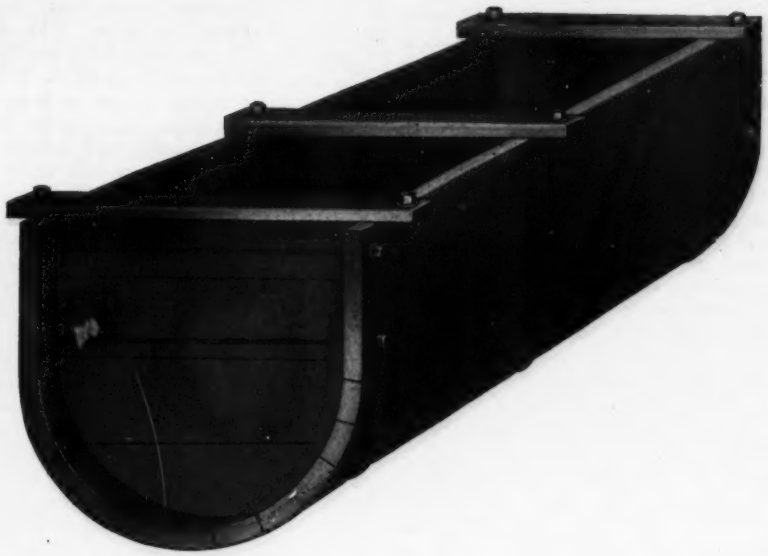
The location of the general resources with relation to the mill and the source of raw material, fuel, labor, etc., are ideal.

All of these, combined with the excellent manufacturing facilities and the superior products made, unquestionably place this mill in an enviable position.

The engineer for the original mill and the improvements just completed was George F. Hardy, of New York City and



KRAFT PULP AND PAPER MILL OF BROWN PAPER MILL CO., MONROE, LA.



STEARNS TANKS

Box Tanks	Acid Towers
Round Tanks	Stuff Chests
Half Round Tanks	Stave Pipe

If it is a wood tank of any shape or design we can make it for you. Our engineering department is ready to assist and to advise you.

The A. T. Stearns Lumber Co.

Neponset, Boston, Mass.

EVERYTHING IN WOOD OR WOODWORK 1849

STEARNS TANKS

the construction work was done by the Morton C. Tuttle Company of Boston, Mass.

Extensive Use of Instruments

In line with advanced paper and pulp mill practice the owners of the new Brown Paper Mill at West Monroe, La., having installed an extensive instrument equipment for checking operating factors and costs. For example, 62 flow meters are installed at this plant for the measurement of steam from boilers, steam for elevators, steam for turbo-pumps, hot water to various units, steam to fourdriniers, steam to evaporator, steam to caustic room, steam for feeders, and natural gas to furnaces. Of these 62 flow meters, 23 are of the indicating type and 39 are recorders. All of these flow meters were manufactured by The Brown Instrument Company and are electrically operated on the inductance bridge principle, permitting maximum flexibility in the location of the indicating and recording instruments with respect to the manometers. All the recorders are equipped with Brown automatic recording planimeters, by means of which flow is recorded in volume units on the same chart with the regular rate of flow record. By means of the automatic planimeter record the mill officials can tell direct from the chart just how many units of steam, water or gas have flowed through the line during any period without logging the integrator.

New Gurley Paper Testing Instrument

Improved Gurley Densometers and Gurley Running Sheet Micrometers are new paper testing instruments manufactured by W. & L. E. Gurley, with main office and factory at Troy, N. Y., and New York City Sales Offices at 49 Chambers street.

The Densometer is an instrument which has been developed to measure the compactness of the fiber structure of many kinds of paper. It has also been found to indicate the effective length of fiber (Jordan or Beater changes) by measuring the uncalendered sample, and to serve as a controlling instrument for those working qualities of the finished sheet which depend on fiber length qualities of the finished sheet or degree of calendering, such as strength, coating, saturating effects, etc. During the past seven years, the Densometer has come into almost universal use. The increasing interest and recognition of the value of the Densometer test have led to the development of a new model which will add to the range of the materials which can be tested, as well as to the uniformity and convenience of the test itself.

In using the original model Densometer, the paper is clamped between two plates in the top of a sliding cylinder which fits loosely into another cylinder. An aperture in the clamp plates is covered by the sample. The cylinder, which is of a known weight, is raised, and allowed to settle, the air which it displaces being forced upward through the paper while leakage around the cylinder is prevented by filling the outer cylinder with oil. The time required for a known amount of air as measured by rings on the sliding cylinder, to be forced through the sample, is the Densometer reading sought.

The new instrument is essentially the same in principle, but considerably different in design. It has the advantage of securing a uniform and reliable test, regardless of the skill of the operator. This is accomplished by changing the position of the clamp, from the top of the sliding cylinder to being a part of the base. In this position, the clamp is no longer limited in weight, and a much better device can be used, making possible many improvements in the instrument, as well as in the speed and accuracy of the test. The improved clamp holds the paper between two steel plates, the upper one being directly beneath the bottom of the outer cylinder, and the lower one held against it by a heavy spring. The paper, when slipped between them, is held directly under a tube in the center of the cylinder, down which the air passes.

A further adaptation of the Improved Densometer is an automatic timing attachment which can be added to the new model. Automatic timing of the Densometer test has two advantages. The first one is the fact that no attendant needs to be present to start timing the test, or to stop the watch or timer when the desired volume of air has passed through the paper. This is particularly important when the tests are for one minute or more. The other advantage comes with the uniform accuracy with which every test can be recorded, important with either fast or slow testing samples, with which it is difficult to decide exactly when to stop or start the stop watch. The Automatic Timing Attachment both eliminates this human error and frees the attendant for other testing.

The Gurley Running Sheet Micrometer is a new instrument developed to furnish an accurate, simple means of measuring the running sheet of paper, as it leaves the calender rolls of the paper machine. Its use will provide constant, working, information for controlling the thickness and weight of the paper. It is an instrument meant for every day use, in the mill, by the machine tender, who can readily check his sheet at any time.

In order to reach far enough in from the edge of the sheet so that the paper will be uniform, the Micrometer is made with throat of 8 inches depth. Since this necessarily allows a slight spring in the casting, the frame which supports the working mechanism must be protected from bending stress and temperature changes. This is accomplished by surrounding the frame casting by another. This outer shell touches the frame only at the point where the two are attached, directly beneath the micrometer rollers. When the instrument is lifted, therefore, the entire bending stress is taken up by the shell, and does not affect the frame casting on the gauge reading.

The shell also serves to protect the frame against warping, resulting from expansion and contraction due to sudden temperature changes.

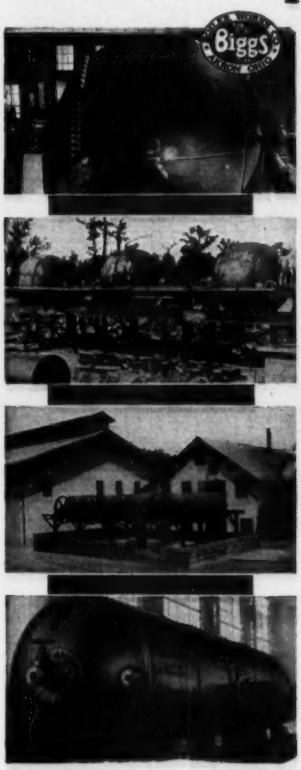
Regal Paper Co. Reorganized

[FROM OUR REGULAR CORRESPONDENT]

PULASKI, N. Y., October 26, 1930.—Announcement is made of a reorganization of the Regal Paper Company which includes a number of changes in the executive staff. The interest in the company held by Fillmore G. Utley, president, has been taken over by Earl H. Benson, treasurer, who is now planning for further development. The transaction involved all of the common stock while a portion of the preferred stock will also be sold. The transfer will take effect Jan. 1, 1931, when Mr. Utley will make other connections.

The Regal Paper Company was organized in 1911 by Mr. Benson and since that time it has built up a nation-wide business for its products, which include paper napkins and toilet paper. The industry originated in the old Pulaski Electric Company's plant but the growing business necessitated larger quarters and in 1913 the property owned by Salisbury & Peach was acquired. This sit has been developed and today is consists of over 100,000 square feet of manufacturing space with excellent transportation facilities. Only a year ago the company purchased the adjoining property of the Standard Oil Company for expansion purposes.

The Biggs Erecting Organization Is As Important to You as Biggs' Fabricating Facilities



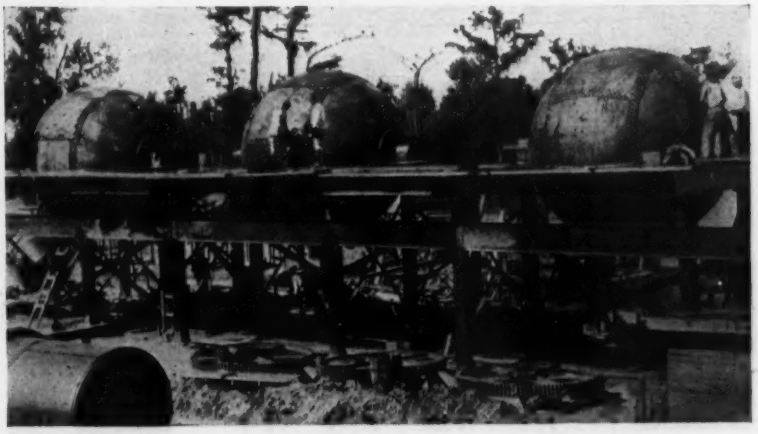
Typical Biggs Installations

Top—Biggs Welded Rotary Digester
Second—Biggs Riveted Rotary Digesters
Third—Biggs Standard Cylinder Rotary Bleaching Boilers
Bottom—Biggs Tumbling Digester

"Built by Biggs"

Welded Globe Rotary Digesters
Riveted Globe Rotary Digesters
Cylinder Rotary Bleaching Boilers
Tumbling Digesters, Welded or Riveted
Sulphate and Sulphite Digesters
Penstocks
Welded or Riveted Steel Plate Construction of Every Description

Biggs Electrically Welded Vessels are accepted for installation in localities where the A. S. M. E. code has been adopted for unfired pressure vessels.



The Biggs erecting organization installing 14 ft. rotary digesters for the Massasoit Manufacturing Company, Lake Charles, La.

Biggs has fabricated and erected paper-making equipment for such leaders in their industry as the Hinde & Dauch Paper Company of Sandusky, Ohio; the Celotex Company, New Orleans; the National Biscuit Company; the Harriman Company, Lynchburg; the Kalamazoo Paper Company of that city; the Standard Paper Manufacturing Company of Richmond; the Sylva Paper Board Company, Sylva, N. C.; Ball Brothers, Noblesville, Ind.; the River Raisin Paper Company, Monroe, Mich.; the Consolidated Water Power & Paper Company, Appleton, Wis., and many others.

Biggs globe and cylinder rotary digesters are standard the world over. Biggs Welded Equipment has won the same confidence as has long been accorded Biggs riveted construction. The Biggs weld is absolutely "stronger than the plate itself". Biggs Welded Digesters have practically eliminated maintenance costs.

Inquiries relating to your present or future requirements will be handled with a promptness which is a part of Biggs service.

THE BIGGS BOILER WORKS COMPANY
AKRON OHIO
New York, Detroit, Chicago

Biggs is completely equipped to produce, not only the more usual steel plate types, but paper mill equipment of special alloys. This cut shows a welded rotary digester of Endure KA-2S Plates ⅝" thick. Test, 225 pounds.

BIGGS ROTARIES *for years of dependable cooking and bleaching..*

The Biggs BOILER WORKS CO. AKRON OHIO

Strathmore Builds Hydro-Electric Station

Put in Operation Early in the Summer of This Year, the New Power Plant Contains Many Unique Features Which Are Designed To Save Time and Money—Water Wheel Equipment Designed and Built by Rodney Hunt Machine Co.

SOME electrical engineers and electrical experts said it couldn't be done but the Strathmore Paper Company is doing it. When the smaller wheel unit is carrying the load and this load increases suddenly, the company phases in the larger turbine water wheel automatically and keeps the paper machines running, thereby preventing a troublesome and costly shut down and starting up again of these machines. Self-synchronizing switching mechanism is only one of the many unique features of the new Hydro Electric Station which the Strathmore Paper Company built at its Mittineague plant, and put in operation June 1. 1930.

The plant was designed to use combined water rights of the Strathmore Paper Company and the Old Agawan Canal Company, which had been formerly used in five different water wheel units, located in three different mills, and all arranged to drive mechanically to the main line shafting. The new station was laid out to use all of this water in three modern vertical hydro electric units, two of which have been installed, and the head gates and space have been provided for the third unit.

The water wheel equipment, which was designed and built by the Rodney Hunt Machine Company, of Orange, Mass., is of the outside gate mechanism scroll case design. One unit is of 1,360 hp. capacity, and the other of 690 hp. The eventual third unit laid out will be a depulicate of the larger wheel. The ultimate effective head will be 34 feet.[1]

The gate house is completely enclosed in a part of the power house structure, accessible from the operating floor. The head gates are of electrically welded structural steel with brass facing strips on stem screw type motor operated gate hoist of the enclosed design, fitted with ball thrust bearings, bronze operating nuts, and running in grease lubricant, presenting a very attractive appearance in the gate house. This equipment was also furnished by the Rodney Hunt Machine Company.

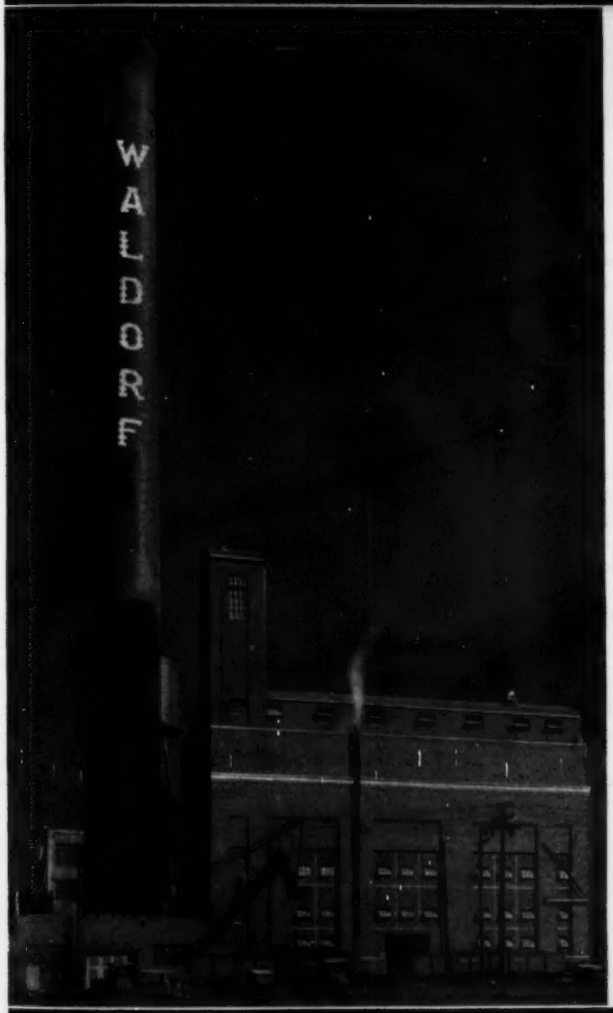
SCROLL CASE UNDER CONSTRUCTION

Few industrial hydro stations are provided with power trash rakes, but Strathmore has left nothing undone at this point, and a Newport News power trash rack rake is provided in the head

[1] The wheels are exactly the same type which showed the unprecendented maximum efficiency of 93.38 per cent on official Holyoke test.

NEW HYDRO-ELECTRIC STATION AT THE STRATHMORE PAPER CO'S MITTINEAGUE PLANT

WALDORF CHANGED FROM 175 LBS. TO 650 LBS. OPERATING PRESSURE WITHOUT INTERRUPTION OF SERVICE



The installation of two 1346 h.p. Edge Moor High Pressure Boilers in the Waldorf Paper Products Company plant at St. Paul, marks the changing over of this plant to a thoroughly modern high pressure, steam installation.

Some of the problems encountered in the erection of these units were unusual, interesting. This plant was originally operating at 175 lbs. working pressure with six Edge Moor longitudinal drum boilers.

The new equipment was to be placed in approximately the same position as four of the old boilers, the operating pressure was to be changed from 175 lbs. to 650 lbs. and continuous operation of the plant was necessary.

Since two of the old boilers were not sufficient to carry the plant load during construction, only one of the new boilers could be erected at a time. Upon the completion of the first new unit the operating pressure was changed over to 650 lbs. and this one boiler was given the responsibility of carrying the entire load during construction of the second high pressure unit with no emergency equipment available in case of necessary shut-down — bearing testimony to the confidence with which Edge Moor installations are made.

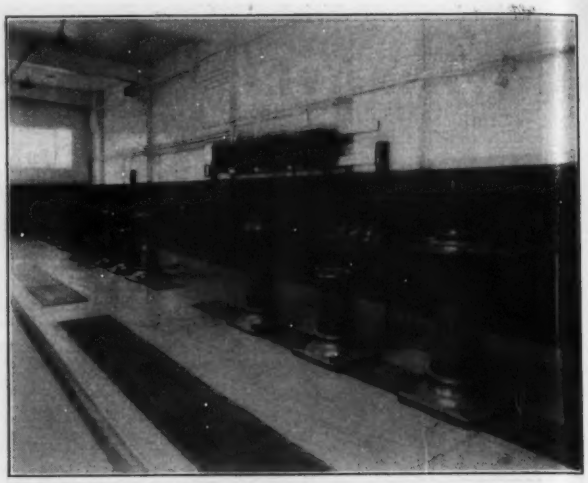
EDGE MOOR IRON COMPANY
Established 1868
Edge Moor, Delaware
New York Boston Chicago St. Paul Charlotte Los Angeles

EDGE MOOR BOILERS — EDGE MOOR, DEL. U.S.A.

EDGE MOOR Water Tube BOILERS

STRAIGHT AND BENT TUBE TYPES—WATER WALLS—AIR PREHEATERS

SWITCHBOARD AND GOVERNOR ROOM



HEADWORKS ROOM

gate house. The Trash Rack which was built by the Rodney Hunt Machine Company is of rather unique design, in that the supporting back bars are located approximately an inch back from the downstream side of the rack bars so that the rake teeth pass entirely through the rack. This construction was worked out by Strathmore engineers for their Woronco station, and has proven extremely convenient during ice flow period, when the power rake can be used to scrape a considerable amount of ice from the rack bars. The rake dumps into a sluice-way of ample dimensions arranged to sluice the trash around the station, and eliminating any handling of this debris.

The 1,750 KVA Generator capacity was furnished by the General Electric Company and it is connected to the steam station at the paper mill 800 feet away, through complete automatic switching, eliminating attendance at the hydro station as well as the human element in the control of the unit.

The governors were furnished by the Lombard Governor Company of Ashland, Mass., and are fitted with General Electric eletcric timers, which provide extreme flexibility in the time element adjustment for putting the unit on the line after the master control has been actuated.

This station is said to be the only industrial hydro electric plant in this section of the country having this automatic synchronizing control corresponding to the most up-to-date central station installations.

Another detail in features of design is the special breaking arrangement for the wheel control gates, consisting of sheer pins arranged to fail at a predetermined point, in case the gates are obstructed in their movement. These pins are arranged to fail in double shear, and have already proved their value by failing without injury to the rest of the wheel equipment.

An Unusual Phase of the Development

A rather unusual phase of the development is the fact that the turbine manufacturer furnished the forms for the scroll casing, which are of reinforced concrete, built as a part of the power house substructure. These forms were shipped in convenient sections for handling, and the more complicated sections at the small end of the scroll form were themselves of reinforced concrete in thin sections, and thus made very smooth to form the inside surface of the scroll passage.

Plans and specifications for the plant were prepared by the Strathmore engineering department, headed by George R. Wholean, and were checked by E. A. Graustein, consulting engineer of Boston. Lyman Howes was the architect. Fred T. Lew & Co., Inc., of New York and Springfield, were the building contractors.

Empire State Forestry Convention

WATERTOWN, N. Y., October 18, 1930.—Among those delivering addresses at the convention of the Empire State Forestry Association held recently at the Black River Valley Club was George W. Sisson, president of the Racquette River Paper Company, G. C. Pichie, chief forester of the Province of Quebec, Dr. Hugh P. Baker, of Syracuse University Forestry College, and John N. Carlisle, of the St. Regis Paper Company. All urged thorough reforestation of agriculturally unfit land in the state to insure a future timber supply while international co-operation with Canada in the development of industrial relations was also stressed.

Mr. Pichie said in part: "We of Quebec have a forestry association similar to yours and through it we have been able to achieve great things. In 1923 we were losing millions of dollars worth of timber by fire but with the work of our organization we instigated legislation which requires individuals to obtain a permit before entering the woods. As the result of this work in the past few years we have greatly reduced our forest fire losses and have established means of fire prevention education. We have also been able to establish a survey of our timber lands and today we boast of holding over 30,000 acres. In 1920 the timber land in Quebec was estimated to contain about 150,000 cords of wood and by means of the survey we are enabled to manage our forests properly.

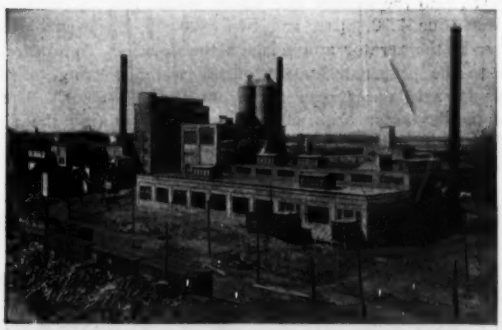
"The paper industry is a vitally important factor in my country. In 1929 Quebec produced 25 per cent of the world pulpwood supply. We are able to produce news print also at a fair price and every year a great many of our farmers produce wood from their own lots which goes into the making of paper. On this North American Continent we have a great wood empire with men to work and manage it so let us work together to promote our forests that they may be a credit to us."

William G. Howard, state forestry superintendent, spoke briefly upon the enlarged reforestation program in the state and said that if the paper making industries are to survive they must necessarily be kept supplied with raw material. "The first state nurseries were established thirty years ago," he said, "and in 1908 legislation was provided which allowed the state to sell private owners their trees at cost. In recent years when the first of the state trees were distributed we received eight orders from private individuals for a total of 27,000 trees. Last year, in contrast, the state planted over 25,000,000 trees of which 9,000,000 were planted by private owners who made some 3,000 orders. This represents the best record ever made by the state but we feel that we have just started."

Dean Baker, of the Syracuse Forestry College, closed his remarks by urging that a survey and classification of the forest lands of the state be made.

To Manufacturers or Users of CAUSTIC SODA

Plant of the Marma Pulp & Paper Co., Marmaverken, Sweden, operating the Dorr Continuous Causticizing System



The Canadian Cellulose Co., in this plant at Cornwall, Ont., operates Dorr Equipment for Continuous Causticizing

DORRCO

IF you produce or recover even as little as two tons of caustic a day, it will pay you to investigate the economies of continuous manufacture. In addition to the advantage of a steady supply of uniformly clear liquor, the Dorr Continuous Causticizing system will give you a compact plant which requires a limited amount of floor space and which can be operated by two men per shift, for a 100-ton plant.

For the small tonnage plants the decantation steps are carried out in a single machine—the Dorr Washing Thickener. One plant producing 6 tons of caustic per day takes up only 300 sq. ft. of floor space.

May we send you further information on the modern method of caustic manufacture. Our nearest office will gladly furnish it.

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PARIS
Societe Dorr et Cie 26 Rue de la Pepiniere

JOHANNESBURG, S. A.
E. L. Bateman Locarno House.

New Filter Plant For Westvaco's Luke Mill

Problem of Water Supply For Piedmont Plant Effectively Solved by New System — Clear Colorless Effluent Turned Out, Which Enables Mill to Keep Running Through Turbid and Acid Stages of Potomac River

By Charles F. Ruff[1]

SUPPLY of large quantities of good water is almost as important to the paper maker as the supply of pulp wood. Indeed the latter can be, and often is, shipped to the mill in cars, but the water used must be taken from nearby sources. If it is unsuited to paper making, it must be filtered and treated to make it suitable. No two waters are alike and no one method of treatment is best for all waters. A study of the raw water is always necessary to determine the way to treat the water most economically. This article describes how the problem of water supply was solved at the Piedmont plant of the West Virginia Pulp and Paper Company.

The plant is located on the headwaters of the Potomac River a few miles below the mouth of the Savage River. At this point the Potomac carries a large proportion of drainage from coal mines, making it very acid. Considerable quantities of iron are present. During floods and after even moderate rains the water carries quantities of yellow clay and is quite turbid. The increased dilution of the mine drainage with alkaline water from the Savage River changes the water at these times from acid to alkaline.

Before the new filters were built it was necessary to shut down the plant for periods of two to three days at various seasons, on account of the turbidity. At other times the iron caused slight discoloration of the paper, and tended to destroy the uniformity of the mill's output. Pieces of sand and grit getting into the paper machines caused considerable trouble by cutting the wires. The sand was thought to come from the wooden tub filters, which were old and greatly overloaded.

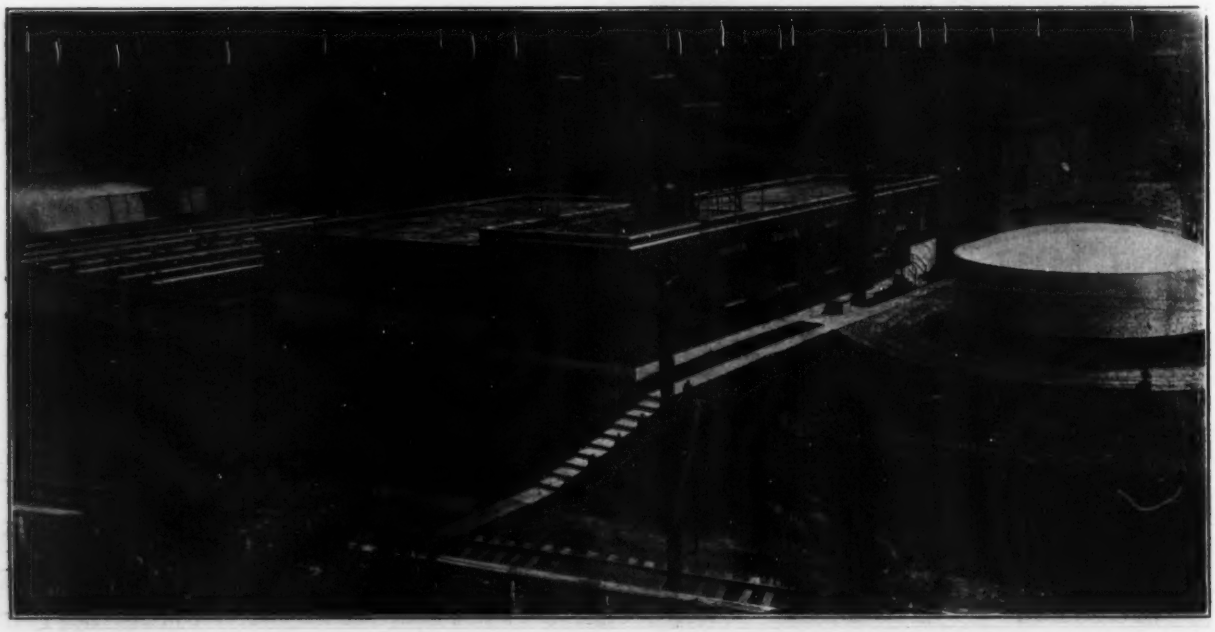
After thorough preliminary studies and estimates had been made, a new filter plant was authorized. Excavation for the work was commenced in September, 1929. At the same time the engineers started work on the detailed plans. Six months later the new plant was put in operation and has been running continuously ever since. It turns out a clear colorless effluent and has enabled the mill to keep running through turbid and acid stages of the river.

Every effort was made to secure an economical design without sacrificing the quality of the water produced. Simplification of the flow of water and washing arrangements; the use of standard pipe, valves and fittings throughout, including the underdrain system; the omission of all unessential filter equipment; providing uncovered coagulation basins and housing the filters and pumps in a simple hollow tile factory type building without interior finish or special architectural treatment, all contributed to this end.

The plant consists of a spray type aerator, two coagulation basins each of one million gallons capacity, four filter units with a total area of 4200 square feet, a pump room with three high lift and three low lift pumps, and two alum bins and chemical dosing apparatus. The structures are built of reinforced concrete throughout.

Water is taken from the river through the old screen house. Alum or soda, or both, depending on the quality of raw water, are fed into the suction line ahead of the low lift pumps. These pumps (one 4200 g.p.m. and two 8400 g.p.m. capacity) force the water to the aerator and through the nozzles. Aeration is essential to the proper treatment of the water, serving to expel the carbonic acid gases resulting from the treatment. The pumps and nozzles serve the further purpose of mixing the alum and soda solutions with the raw water, eliminating the necessity for mixing tanks or mechanical paddles.

[1] Designing engineer with Malcolm Pirnie, consulting engineer, New York City.



VIEW OF WATER PLANT. COAGULATION BASIN AND AERATOR TO LEFT. FILTERS IN CENTER, PUMP ROOM AND SODA STORAGE TANKS TO RIGHT

BROADWAY AND FIFTH AVENUE
AT MADISON SQUARE, NEW YORK

A GREAT COSMOPOLITAN MARKET . . . THE FIFTH AVENUE BUILDING

"MORE · THAN · AN · OFFICE · BUILDING"

COME to The Fifth Avenue Building and see the production of a million hands, the output of a thousand mills. Step into a smoothly running elevator and glide past acres of offices all humming with the business of a world.

Glance at the others standing in the elevator. That bronzed man next to you has come from Texas to buy novelties. The trim little woman getting off at the tenth floor is a card buyer from Canada. Here is a man from Cleveland interested in the newest displays of paper products. There is a London merchant chatting with a South American department store executive. They are here to buy. They know that in one trip they can complete seasonal negotiations with paper concerns, mill engineers, pulp manufacturers, paper box concerns, stationers and other kindred businesses.

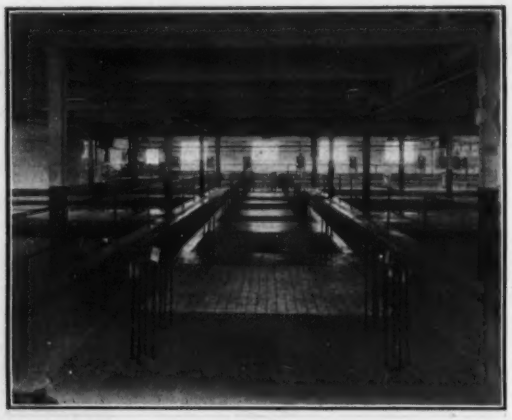
The Fifth Avenue Building is situated at the intersection of Fifth Avenue and Broadway, Manhattan's two most famous thoroughfares. Fronting spacious Madison Square, unshadowed by skyscrapers, sunlight and air pour through its windows.

Accessible from any part of metropolitan New York, the building is only thirteen minutes to Grand Central by subway and ten minutes to Pennsylvania Station. Busses and surface cars pass the doors. A booth in the lobby supplies information concerning lines listed within the building, places of amusement and points of civic interest. An attractive restaurant on the main floor serves excellent food.

Allow us to show you through the building during the next trip you make to New York.

THE FIFTH AVENUE BUILDING

PUMP ROOM SHOWING RAW AND PURE WATER PUMPS



VIEW OF FILTERS AND OPERATING GALLERY

The water flows from the aerator slab to the basins where coagulation and settlement take place during a four hour retention period. The basins are 200 ft. long by 50 ft. wide, with sloping bottoms to facilitate cleaning. The walls are sloped at the water line to deflect ice pressure. Concrete tie beams hold the basin walls together. All joints are made tight with a strip of corrugated copper cast into each block. Tests of the basin showed less than ½ inch drop in water level in 24 hours.

The settled water from the basin is carried through concrete channels to the four filters. Each filter is subdivided into two sections by a wall, and these sections are again divided by a wash gutter placed on a low wall. All four sections of the filter act as a unit during filtration. Washing is done by causing water to flow back up through the sand bed at a relatively high velocity (2 ft. per minute). This eliminates any need for compressed air washing with its compressor and pipe system. The sand is raised off the gravel and thoroughly cleaned by the water alone, and the washings are carried off by the gutter. In order to cut down the size of the pump, pipes and sewers needed for washing, only one section (one quarter bed) is washed at a time. The gutters between the two sections of the beds serve for either section. About 20 minutes is required to wash all four sections of a filter.

The rate of filtration is governed by four rate controllers. These devices assure a uniform flow of water through each filter whether they are clean or partially clogged.

A small filtered water reservoir is located under two of the filters and the high lift end of the pumping station. The three high lift pumps and the wash water pump take their suctions directly from this reservoir and deliver the filtered water to the mill.

All the pumps are motor driven centrifugals operated on current brought from the mill power house. A crane is provided in the pump room.

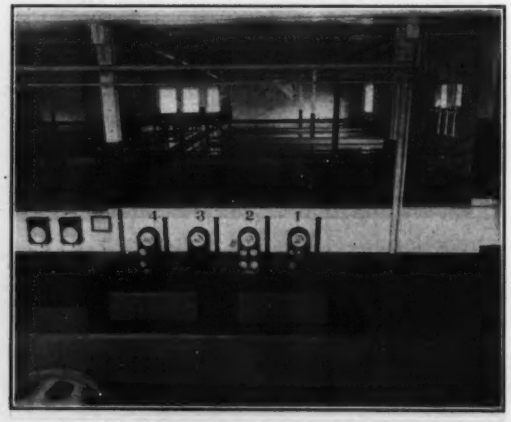
The chemical room is built at one end of the pump room. The powdered alum is brought in on an elevated siding and shoveled from the box cars into two concrete hoppers. The chlorine containers are stored on supports on top of the hoppers and the container in use is set on a weighing platform. Below the alum storage hoppers are weighing hoppers to check the amounts of alum used, and below these again the machines which feed the alum at a measured rate and deliver it in solution to the raw water intake channel.

This arrangement provides duplicate alum dosing equipment. The soda ash for use in the raw water and the caustic soda for correcting the acidity of the finished water are stored in solution in tanks and dosed through orifice devices. Since a part of the supply is for domestic use it is chlorinated as an extra safety precaution. Chlorine is also applied to the raw water when iron salts are present in it.

The building is of hollow tile with a flat concrete roof supported on structural steel. A heating boiler is in the cellar.

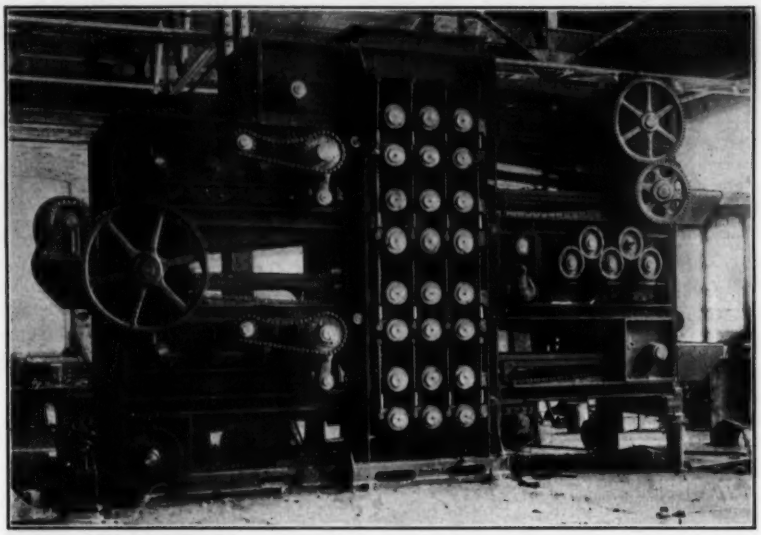
The cost of this twelve million gallon per day filter plant and high and low lift pumping station proved to be surprisingly low as compared with a number of municipal plants of the same size. A large part of the credit for this low cost was due to the speedy and efficient construction done by the contractor, the Morton C. Tuttle Company of Boston, on a cost plus basis.

FILTER CONTROL APPARATUS, WHICH AUTOMATICALLY ADJUSTS THE RATE OF FILTRATION TO THE DEMAND



FILTER GAGES WHICH SHOW RATE OF FLOW AND LOSS OF HEAD THROUGH FILTERS

50 ton Pulp Washing Press



By the use of Kutztown Pulp Washing Press, increased efficiency may be obtained in the washing of pulp through the use of an entirely different method of manipulation of the pulp which makes it possible to accomplish the washing by the use of relatively small quantities of water.

It is estimated that most companies use between 12 to 20 pounds of wash water per pound of pulp, and a very large amount of this wash water containing quantities of chemicals is discharged directly into the sewers or streams. By our process, we figure on using from 1½ to 2 pounds of fresh water per pound of pulp, which becomes strong liquor and is sent direct to the evaporator, effecting not only a saving in steam, but what is more important the increased recovery of the chemical used.

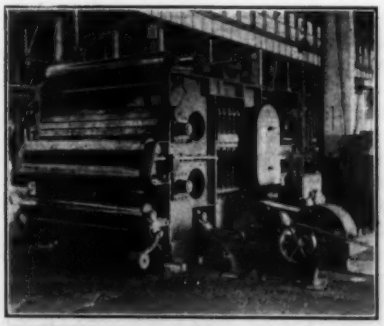
LARGE DIGESTORS. At present the manufacturer is restricted in the size of the digestor by the size of the diffuser, as one diffuser must take care of a complete charge of a digestor. With our press, digestors of any size can be used provided a blow pit of sufficient capacity to take care of one digestor charge is installed, and sufficient liquor is provided to dilute the charge to such an extent that it can be pumped to the top of our press.

SHORT CONTACT TIME. It has been found that a short time of contact between the pulp and the black liquor during the washing period greatly improves the color of the pulp and reduces bleach consumption. In our press the contact between pulp and black liquor is reduced to a few minutes instead of from 6 to 8 hours in the wash tanks and diffusers.

Full details and literature sent upon request

KUTZTOWN INSULATION AND FIBRE BOARD PRESS

This caterpillar type press is composed of two heavy steel movable aprons, one on top and the other on the bottom. As these aprons converge the material passing through is gradually pressed, eliminating the water to the extent required for future drying of the board. At a certain point these two aprons run parallel to one another for a limited distance to permanently form the thickness of the board. The pressing zone is supported by two heavy girders and the necessary pressure is regulated by means of heavy springs.



KUTZTOWN FOUNDRY AND MACHINE CO.

WORKS: KUTZTOWN, PA. .....Office: 1421 Chestnut St., Philadelphia, Pa.

P. H. Glatfelter Co. Improves Spring Grove Plant

An Entirely New Paper Making Unit, From Repulping Department To Finishing Room Is Scheduled To Go Into Operation Early in November—New Power Plant Equipped With All Modern Features Is Model of Efficiency

THE P. H. Glatfelter Company of Spring Grove, Pa., has taken advantage of the general business depression that the country has been suffering, using it as a buffer by which to replace obsolete machinery and install new and modern equipment economically, and to be in a still better position to meet the demands that will follow the return to normal conditions. The improvements in the plant have been far-reaching—another great advance in 64 years of constant growth.

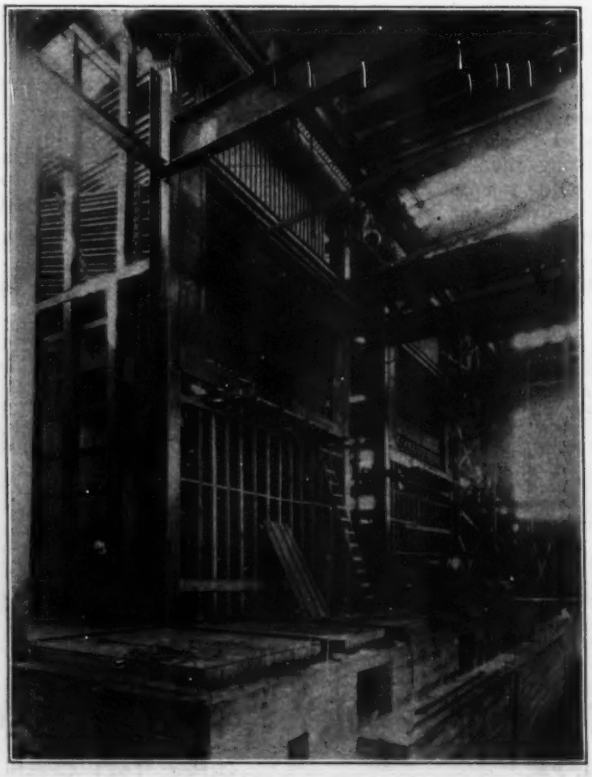
Pulp Mills Enlarged

In the pulp mills the buildings housing the chippers have been enlarged, the caustic liquor house overhauled to obtain better ventilation, equipment installed for reclaiming by-products from the wood formerly wasted, and the bleaching department entirely renovated. Here cleaner, stronger and whiter pulp is now obtained through the operation of a high density bleaching system, a complete new system of washers, agitators, and filterers installed. The old wooden storage vats have been removed and tile tanks built in their places.

High Speed Beaters Installed

The beater room that supplies four of the paper machines was formerly equipped with Umpherston beaters. These have been taken out and replaced with high speed beaters of much greater capacity and of greater efficiency. Not only has this made greater and more efficient production, but also has greatly improved the appearance of the room. In several instances new Jordan engines have been installed with the new beaters.

An entirely new paper making unit from a repulping department to the finished product is now under construction and is scheduled for operation the early part of November. The beating equipment for this new unit will be four high speed beaters with dual drives and three Majestic type Jordans. The stock will be cleaned by Bird screens. The machine, a Fourdrinier with a wire width of 192 inches will achieve the peak in modern paper machine construction. It is being built by the Pusey & Jones Company of Wilmington, Del., and will be equipped with two presses, two series of driers totaling thirty-one 60-inch driers between which will be a smoothing roll and breaker stack, two calender stacks made by the Farrell Foundry and Machine Company and a Cameron rewinder. All of the parts will be driven as separate units by a General Electric multiple generator set designed to give a speed capacity ranging from 100 to 850 feet per minute.



VIEW IN BOILER ROOM OF P. H. GLATFELTER CO.

In addition to the new buildings to house this paper unit, second floors have been built over two beater rooms in which have been constructed crane systems for handling storage material. A second floor has also been built over part of the present finishing room which will contain a 116-inch Hamblet cutter and Seybold trimmer, space for stocking finished paper, and space for the finishers in preparing the paper for shipment. Another building has been added to the back of the new machine building which is also equiped with crane service and which will be used for pulp storage.

Inside Siding Built

An inside siding has been built to take care of three cars, making the total capacity ten cars on inside sidings for shipping purposes, and an additional loading platform built for truck service. A new testing and checking room has been built.

New Filter Beds Added

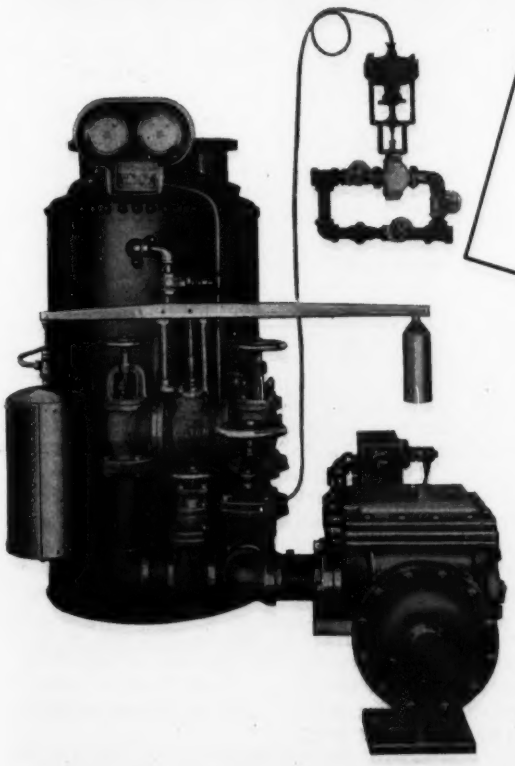
In addition to the foregoing changes and improvements which have been directly applicable to the making of paper there have been other extensive changes made. New filter beds have been added to the fresh water filter house, and an additional water supply developed by the digging of Artesian wells. The former will increase the filtering capacity to 7,500,000 gallons per day. The entire mill water supply has been piped for a closed water system which will make possible considerable economy in water consumption as well as in purifying the stream of waste fiber.

The calendering, finishing and shipping rooms will be equipped with an humidifying and air control system which will maintain the relative humidity constantly at between 50 and 55 per cent and the temperature at 70 degrees. This not only will allow for more uniform paper and freedom from curl and wrinkles but also for better and more comfortable working conditions. The Gladfelter mill is the only one at present being thus equipped. The system is being installed by the York Ice Machinery Corporation, of York, Pa.

Having installations of 350 pound pressure boilers with super-heaters, economizers, forced and induced draft fans, along with water walls and a pulverized coal system, the new power plant of the company represents the most modern practice in power plant design. The new boiler room is of brick with interior walls in glazed tile. Space is available for an additional unit adjacent to the two new boilers.

The pulverizers, located in the

FULTON REDUCES STEAM PRESSURE 80%



THE CRYSTAL TISSUE COMPANY

MANUFACTURER OF CRYSTAL TISSUES

WHITE, COLORED, MANILA AND WAXED

MIDDLETOWN, OHIO, Sept. 13, 1930

The Midwest-Fulton Machine Co.,
Dayton, Ohio

Gentlemen:

Sometime ago, we equipped three of our tissue machines with your Fulton Dryer Drainage Systems, and we are glad to report that we are well pleased with the results obtained.

Where we formerly carried 10 pounds steam pressure in our dryers, we are now carrying only 1 to 2 pounds and sometimes there is a vacuum inside the dryers. Even with these extremely low pressures, we are never bothered with water in our dryers and the drying is steady and uniform. This has practically eliminated snap-offs in the dryer section.

We recently ordered another Fulton system for one of our other machines which system we expect to put into operation in the near future.

Yours truly,

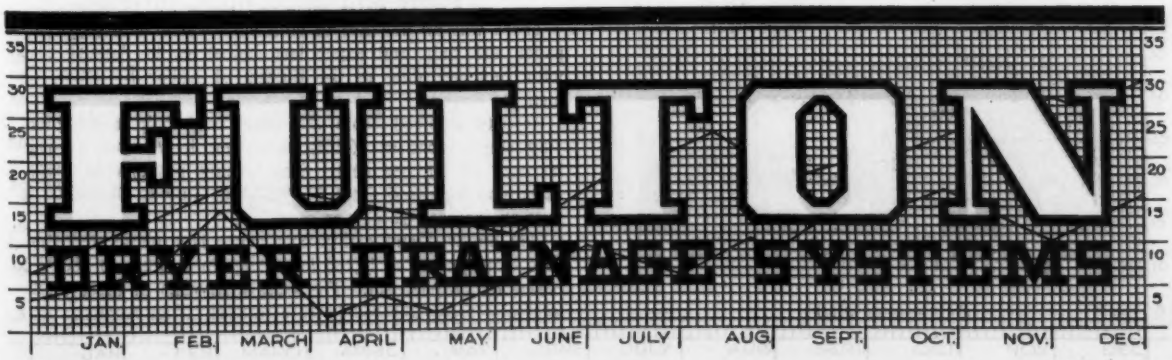
THE CRYSTAL TISSUE COMPANY

President

ZWR:AML

CAN YOU honestly feel that your own drying conditions are equally satisfactory? Have you ever checked your machine performance against other machines making similar grades? ¶We can do this for you. Our engineers are especially trained to analyze drying problems and to tell you what your machines should produce on any grade. ¶Are you getting the most out of your machines? ¶If you don't know, write us today.

MIDWEST-FULTON MACHINE COMPANY
DAYTON · OHIO



basement with only the feeders on the firing floor give the plant an attractive and roomy layout.

The boilers are of the cross drum type. The units are rated at 1,138 h.p. and are fired by means of two pulverizers, either of which are capable of operating the boilers at 225 per cent. Continuous operation of 115,000 pounds of steam per hour is available, with peaks of 130,000 pounds.

The furnaces are designed to give maximum of turbulent burning, and are a combination of air and water cooled construction, with B.t.u. release of approximately 20,000 at the continuous maximum rating.

Handling Ash and Soot

A unique feature of the installation is the handling of ash and soot, arrangements having been perfected whereby most of the fly ash is precipitated and this ash is handled by a vacuum method direct to the storage bin.

All firing is done by means of full automatic control, with instruments available to keep check on the complete operation, efficiency and economy. Boiler panels are erected on the firing floor, upon which are mounted the flow meters, CO_2 recorder, draft gauge, watt hour meters, etc., together with the controllers for the forced and induced draft fans.

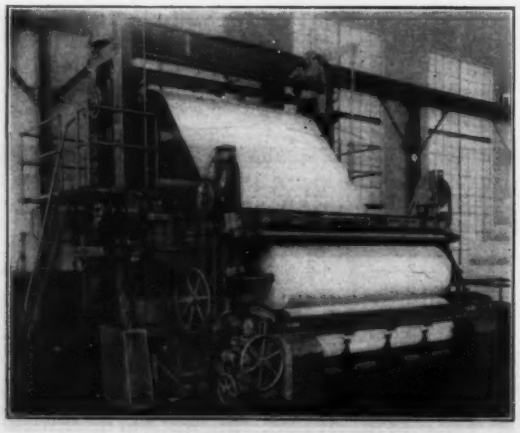
Feed water is passed through economizers, after it has been treated by means of zeolite water softener, and carried from there over to a deaerating type of feed water heater. Temperature of the feed water is secured by the exhaust from the boiler feed pumps, continuous blow down, etc., with provision made for automatically supplying additional steam from the turbo generator to maintain temperature of 212 degrees.

Steam from the new boilers is carried over to the turbine, from which extraction steam goes to the paper machines, evaporators, etc. High pressure steam needed in the plant, is taken direct from the boilers and supplied to the plant through reducing valves or back pressure turbine generator. This installation utilizes as many of the desirable features of central station practice as may be economically combined into industrial operation. The combination of central station power and that made by the company's own plant obtains both steam and power at the minimum cost.

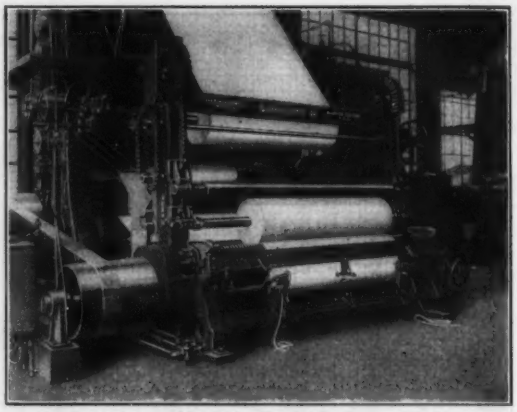
New Calender Winders Create Interest

Two recent winder developments which manufacturers of calendered paper are hoping will go far to relieve them of roll trouble in connection with calenders are illustrated below. These machines are designed to feed the web to the calender and rewind it into rolls of any width desired.

The Consolidated Water Power and Paper Company, Bryant Paper Company and the Jessup & Moore Paper Company are



CAMACHINE 48-9



CAMACHINE 46-9

a few concerns which have installed these machines in their mills, and it is understood that many other mills are planning to include funds for the purchase of this type winder in their next budget.

The machines use the patented score cut method of slitting, unique on all winders made by the Cameron Machine Company. The makers state that the difference between the Camachine 48-9 and 46-9 is mainly a matter of size and speed. Camachine 48-9 is built in widths of 93 to 152 inches and winds rolls to a maximum diameter of 36 inches at speeds up to 1000 f.p.m. Camachine 46-9 winds the same diameter roll, but is built in widths of 53 to 92 inches and is designed to operate at speeds up to 800 f.p.m.

Bridgeport Grinder in Paper Mills

More and more the paper and pulp industry is appreciating the value of keeping their knives sharp, whether for the paper trimmer, the chipper, the barking machine, or the rag cutter. Unless this is done, there will be rough edges on the sheets, or too much time will be spent in the other operations and the results will be poor. To meet this need, the Bridgeport Heavy Duty Knife Grinder, equipped with sectional grinding wheel, was brought out. The machine has been successful. The Bridgeport machines grinding all classes of knives may be found in all the leading mills.

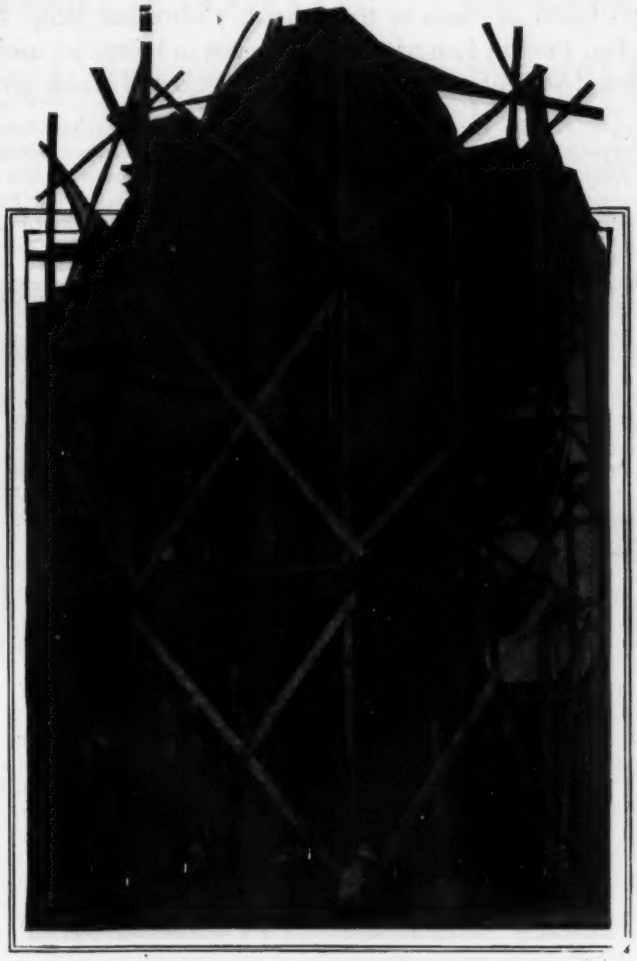
The Sectional Grinding Wheel might be termed a cup or ring wheel, made up in a series of abrasive sections, allowing for a clearance space between each of the sections. This is a decided advance and readily permits the water to penetrate to the center of the wheel and the cutting point, and also carries off the steel ground from the knives. It thus has a very close cutting action preventing the burning of knives and assuring a keen cutting edge which will not crumble away.

Paper Mill Employment Increases

There was an increase in both employment and payrolls in the paper and pulp and paper box industries in August compared with July according to the Bureau of Labor Statistics, Department of Labor.

Reports received from 206 paper and pulp mills gave their July employment at 56,151, increasing in August to 56,212 an increase of 0.1 per cent. The weekly payrolls in these same mills also increased from $1,391,701 in July to $1,429,200 in August an increase of 2.7 per cent.

One hundred and eighty-nine paper box plants reported their July employment at 18,182 increasing in August to 18,502 an increase of 1.8 per cent. The weekly payrolls in these plants also increased from $409,847 in July to $411,117 in August.



Erecting a Manitowoc Digester

For more than a quarter of a century we have been designing and building paper mill equipment. In all these years many installations have been made in mills in the United States and Canada. Repeat orders indelibly indicate the kind of service Manitowoc equipment is giving.

It will pay you, when in the market, to consult us—to let our engineers co-operate with you. An inquiry does not obligate you.

We design and build barking drums, sulphite digesters, experimental digesters, globe rotary digesters, cylindrical digesters, rotary lime kilns, incinerators, disc evaporators, air nozzles, diffuser tanks and swing pipes, bleach and clay mixers, rod mills, Moore speed-cranes, shovels, draglines and trenchoes.

MANITOWOC ENGINEERING WORKS

MANITOWOC, WISCONSIN

Installing Largest Barker At Port Alice Mill

New Equipment Being Placed in Plant of the British Columbia Pulp & Paper Co. Ltd. Will Handle Pulpwood Ten Feet in Length and 26 Inches in Diameter and Will Be the Heaviest Type Ever Used—Is Expected To Effect Considerable Economy

THE British Columbia Pulp and Paper Company Limited operates two mills for the production of high grade sulphite pulp. The mill at Port Alice, B. C., producing bleached pulp, has made a special study of a development of clean wood for chips as a matter of the greatest importance to the securing of a very clean pulp.

To Handle Logs Ten Feet Long

In addition to this, economy demands the use of a larger part of the tree as now cut in the forest and curtailment of the waste involved in present systems of breaking down the log of pulp wood. As a consequence the company is now in the course of installing at Port Alice a Thorne Barker to handle logs ten feet in length and up to 26 inches in diameter. The barked logs up to 22 inches diameter will go directly to a Karlstad chipper provided by the Paper Machinery Company of Montreal. Logs

THORNE BARKERS INSTALLED, SIDE VIEW

over 22 inches in diameter will be split by horizontal steam splitters before going to the chippers.

First of Its Kind on Pacific Coast

This installation involves the use of equipment of a larger and heavier type than has even been used elsewhere and a special design has been necessary. The Barker installation will be the first of its kind on the Pacific Coast and this pioneer work will be of interest to many other mills.

Under present logging operations, followed by the use of sawmills, it has not been found feasible to use the tops of trees or small logs of diameter less than 10 inches. Even with the larger logs the loss in saw kerf alone has been from ten to eighteen percent of the best of the wood. With the new equipment it is hoped that not only will this sawmill loss be over-

DRIVING GEARS, THORNE BARKERS

come but also a way may be found of handling the smaller logs so that they may no longer be left behind in the forest.

W. L. Ketchen, plant manager at Port Alice, is assisted by a very able staff of technical men who have helped him to produce the fine product now well known to mills all over the world, and this installation is one of a number of improvements, some of which have been carried out and some of which are still in course of study, in connection with the determination to live up to a reputation of consistent quality.

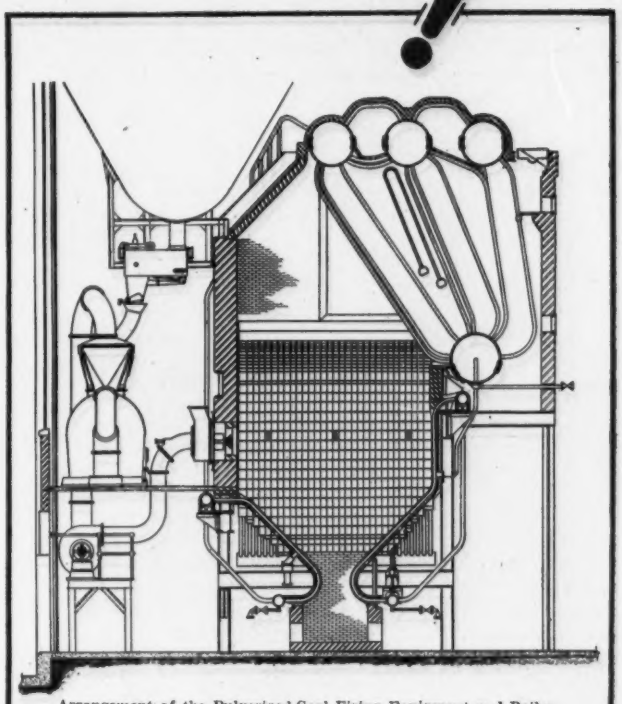
Michigan Paper Co.'s Improvements

The Michigan Paper Company, of Plainwell, Michigan, has made considerable changes in its plant, not so much for the purpose of increasing tonnage production but more for improving the quality of production. The company is at the present time building a new boiler plant. This new boiler plant, however, is being put in for the purpose of reducing steam costs.

BLEACHED SULPHITE PLANT OF THE BRITISH COLUMBIA PULP & PAPER CO., PORT ALICE, B. C.

Changing Firing Method Doubled Boiler Capacity

A 100 per cent increase in boiler capacity obtained by changing the method of firing and adding a Bailey Furnace.



Arrangement of the Pulverized-Coal Firing Equipment and Boiler at the Hinde & Dauch Paper Company's Fort Madison Plant.

Similar Fuller Lehigh equipment is also operating satisfactorily at the Sandusky and Muncie Plants.

INCREASING the steaming capacity of the plant without adding another boiler was the crux of the problem at the Fort Madison, Iowa, plant of the Hinde & Dauch Paper Company. It was realized that the existing stoker-fired boilers could not be operated above 150 per cent rating except with high furnace maintenance and excessive boiler outage.

Hinde & Dauch and Fuller Lehigh Engineers gave the situation study—So it was decided: change over one of the boilers to Fuller Lehigh pulverized-coal firing and install a Bailey Furnace which would permit the boiler to be operated at 300 per cent rating and supply the additional steam required.

Since the changeover to pulverized-coal firing, the boiler may be operated at 300 per cent rating in a very satisfactory manner.

Co-operating with your own engineer, Fuller Lehigh Engineers can make an analysis of your plant conditions. And their services are yours without charge or obligation—Perhaps their recommendations may prove as valuable as in the incident cited here and in many other similar cases.

FULLER LEHIGH COMPANY
A Babcock & Wilcox Organization
FULLERTON, PENNA.

FULLER LEHIGH

PULVERIZED-COAL EQUIPMENT ~ WATER-COOLED FURNACE WALLS

Scott Paper Co's Mill Has Many Innovations

Entirely New Equipment In High Speed Tissue Machines and High Power Units Has Been Added to Chester Plant During Past Several Years—Most Recent Development In Calender Structure Proves Great Saving In Many Ways

OUTSTANDING in the achievements of the paper trade in the current year is the record sales of the Scott Paper Company, of Chester, Pa., despite keen competition and the general depression. Interesting are the details of how this record was attained by simple application of the pulmotor of sales psychology, preparedness, with ample and original equipment in mechanical units to meet an emergency, vigilance of employees, and their productive qualities, and encouraging initiative through adequate compensation in the matter of salaries stimulated and inspired co-operation of workers with the management in its ambition to lead in the market of paper tissues. These attentions to details of personnel and equipment resulted in record sales of any single month in the history of the firm for September of $1,030,308 and for the first nine months of the current year the highest record ever established for the period, of $6,489,722, in comparison with $887,701 for the September sales of 1929 and for the first nine months of the same year of $5,852,007.

Preparedness In Machinery

To begin the foundation for this record sale, the Scott Paper Company had to be in position for mass production and to originate units in machinery that would meet the needs of such volume as it had planned in sales policy. It has established an efficient corps of engineers, including the following members who are responsible for the major success in production through development of units that would permit tremendous output: Harry Leibeck, second vice president, consulting engineer; C. M. Howell, chief engineer, and P. H. Parsons, development engineer.

These engineers, in coordination with the Moore & White Company, Philadelphia; the Pusey and Jones Company, Wilmington, Del.; Lobdell Car Wheel Company, Wilmington, Del.; Minton Vacuum Dryer Corporation; S. K. F. Industries, and the General Electric Company, have perfected a mechanical department that has scored equal triumphs in the matter of record producing units and novel as well as original ideas in paper making machinery. It was in co-ordination with the engineers of the staff of the machinery manufacturing concerns that these unique factors and revolutionary methods of production were introduced. Among the first in paper making machinery as carried out in the Scott Paper Company's plant are the original towel-making, highest speed tissue machines, the first machine calenders constructed with anti-friction S. K. F. Bearings, designed and built within the past year or so by the Lobdell Car Wheel Company—the most recent and newest development in calender structure which has proved to be a great saving in the matter of renewal of lubrication through elimination of the circulating oil system and reduction in the power consumption. It permits heavier pressure and, being inclosed, assures freedom of all foreign substances from the bearings.

Anti-Friction Bearings On Calenders

The calenders were built by the Lobdell Car Wheel Company, within the year, under design calling for three rolls, two 13 inch by 170 inch and one 28-inch by 170-inch equipped with ratchet lift and all roll journals fitted with S. K. F. self aligning Roller Bearings and six S. K. F. bearings costing over $2,000 and the total weight of the machine being 58,000 pounds. Normally rolls in paper machines are not equipped with anti-friction bearings and it is believed that this is the only calender machine in the paper industry that has anti-friction bearings. The 175 inch machine, of extremely high speed, is equipped throughout with these anti-friction bearings. The housing is specially designed to meet the requirements of the roller and the bearings are entirely enclosed.

High Speed Tissue Machines

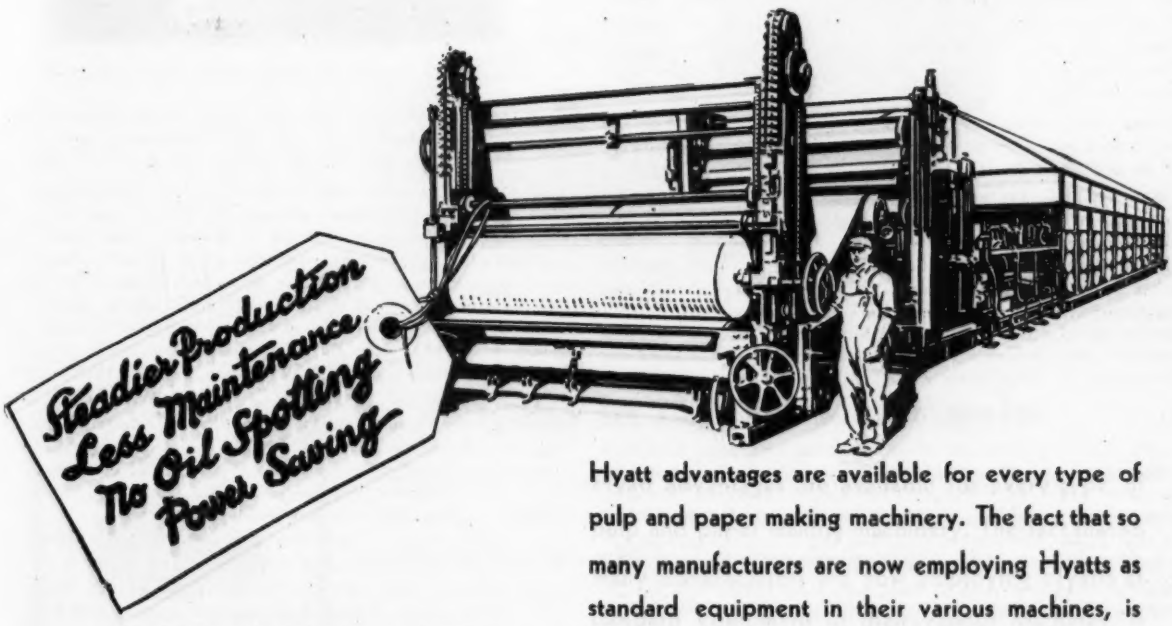
Initial high speed machine was installed by the Pusey and Jones Company, and its output was over 900 feet of tissue per minute and this constituted the first step in the equipment of the plant for exceptional increase in production. This machine was designed and developed with the Scott company engineers and was an entirely new pattern as well as original construction. It was followed within the last two years by installations of three other high speed tissue machines, wihch matched the original 175 inch machine of the Pusey and Jones design, made under the direction of the engineers of the Scott Paper Company and the staff of the Moore and

GENERAL VIEW OF THE PLANT OF THE SCOTT PAPER CO., CHESTER, PA.

Here's what you get . . . and more

Easy starting, smooth running paper machinery is equipped with Hyatt Roller Bearings. Down time for repairs and adjustments, because of bearing wear or failure, is eliminated. Production is increased, and upkeep cost substantially reduced.

Positive, economical lubrication is assured. There is no oil leakage, no spotting. Compared with plain bearings, Hyatts save two thirds of the lubricant used, and time necessary to apply it.



From the standpoint of application and operation, Hyatt Roller Bearings have so many advantages in their favor that they are fast becoming the standard antifriction bearings for pulp and paper mills.

Hyatt advantages are available for every type of pulp and paper making machinery. The fact that so many manufacturers are now employing Hyatts as standard equipment in their various machines, is proof of the fact that the Hyatt Roller Bearing . . . with generous load capacities . . . is particularly suited for this use.

Whatever the application, Hyatts help make more and better paper, at less cost. Specify them on your next equipment order.

HYATT ROLLER BEARING COMPANY
Newark Detroit Chicago Pittsburgh Oakland

HYATT
ROLLER BEARINGS
PRODUCT OF GENERAL MOTORS

White Company with a hundred or so greater footage of tissue output per minute. There are four Moore and White tissue machines in erection in the plant, three 175 inch machines and one 90 inch machine, which has been placed in operation this year.

The Scott Paper Company claims to be the first concern to produce paper towels and this branch of the business was begun in 1910 on the founding of the present manufacturing company by the late Arthur H. Scott, who succeeded to the business of E. I. Scott, Philadelphia paper jobber, at 27 North 6th street, in 1879, and who began in a small way. It was with the need for soft papers to meet the modern plumbing that induced the late head of the company to go into the manufacture of sanitary tissues and in a far sighted way he grasped the tremendous possibilities which such a business might involve. It was he who induced several manufacturers to go into this line of production for a growing clientele of jobbers and dealers who began to find an excellent market for the new product under their own labels. Lack of uniformity in the quality and textures of the tissues sold under this policy demonstrated the need for standard quality and standard brands, so the head of the Scott Paper Company determined to produce under his own methods, with the opening of the tissue mills in Chester, and the establishment of the Scott Tissue Products.

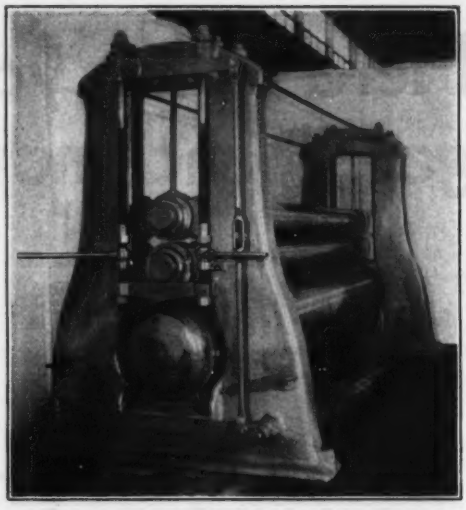
Today the company is producing over two million cases of Scott tissues per year—the cases running in 25 packages of towels, and 50 and 100 rolls of tissues. The plant is being operated on 24 hour schedule and seven day week. The equipment for this production has been installed over a period of seven years, the two newest machines having been added in the past couple of years. Shipments are sent all over the world as well as to the domestic market where national distribution has been built up by persistent advertising in the national magazines, newspapers, trade organs, building of sales organization and by promotion of the financial returns to those who are affiliated with the company in sales and distribution as well as in their productive divisions.

Sales Built On Intensive Drives

Sales drives by allotment of quotas to the staff have been built to the present record volume by special concentration on that most important factor of stimulation of human endeavor—adequate compensation in finacial returns to the individual. Despite the fact that Scott papers are higher than the average tissues on the market the firm was able to roll up a record year through giving additional returns in cash to those who were linked with its distributive branches both as sales representatives and distributors. During September an 11 per cent increase was allotted to sales managers, staff representatives and to distributors and a substantial cash award in the prize contest which was held in that month for the attainment of a million dollar record of sales of Scott tissues. Throughout the year there will be given a bonus on attainment of the quotas allotted sales representatives and to distributors who sell a stipulated amount of these papers. In the staff of workers at the Chester mills there is particular attention given to high wages for its employees, to encourage efficiency among the helpers and to stimulate initiative in employee talent. The Scott workers in all branches receive higher wages, it is stated by Personnel Director R. H. Diament, who looks after the working force welfare at the mills. Particular care is exerted in watching the returns in productive work of each employee, both at the plant and in the field of distribution so that drones are weeded out yearly in the progress and process of fitness of the staff and development of its business.

Employee Ownership

It is not generally known that the Scott Paper Company is controlled chiefly by its employees, or men who have been linked with its executive administration throughout the lifetime of the late head of the company. When the late Arthur H. Scott passed away in 1927, he made in his will a special request that three members of the executive staff take over the administrative offices



LOBDELL MACHINE CALENDERS WITH S.K.F. BEARINGS

of the company and that the Scott share in the stockholdings of the firm be divided among the named executives and the employees who desired to become holders of shares. Today, two of the named executives are holders of chief offices in the company. They are President Thomas B. McCabe and First Vice President and Treasurer Edward S. Wagner. The entire official and executive staff follows:—Officers, E. Irvin Scott, chairman of the board; Thomas B. McCabe, president; Edward S. Wagner, first vice-president and treasurer; Harry Liebeck, second vice-president; Ralph E. Rhoads, secretary; Raymond C. Mateer, assistant treasurer; John B. Hay, assistant secretary. Board of Directors, Clinton Calvert, William S. Campbell, Harry Liebeck, Thomas B. McCabe, Raymond C. Mateer, William F. Mohen, Gilbert Kinney, Ralph Rhoads, E. Irvin Scott, Edward S. Wagner. Operating Executives, W. M. Carney, chief accountant; R. H. Diament, personnel director; C. M. Howell, chief engineer; P. H. Parsons, development engineer; W. W. Tomlinson, advertising manager; James McKenty, production manager.

Controlling interest, however, may eventually rest entirely in the hands of the workers, as yearly they take over in the open market shares in the company through a purchasing fund established by the Scott Tissue Beneficial Association, which is conducted under direction of the company and directed by R. H. Diament. Besides directing and looking after the welfare of the workers in the home, in sickness and in health and working conditions, the welfare ogranization buys shares of stocks for the workers, last year taking over by purchase in the open market $75,000 worth of stock. There has been built up in the period of three years a surplus of $35,000 which is to be devoted to the welfare of the workers. Every employee is insured for $2,000 and additional health and accident, surgical and maternity benefits are included. This aids in building better morale among the workers. There are 880 stockholders representing 35 per cent of the employees, who own 75 per cent of the stock of the company. These employes deposit in the fund which is being built for the purchase of stocks in the market, according to their ability to invest. There are six hundred employees on the payroll of the plant.

Plant and Equipment

There is in addition to the mammoth paper making plant and warehouses specially constructed bulk heads for shipping purposes along the Delaware River which give the company 380 feet along the river bank. Conveyors are used to unload pulp from the Canadian reserves of the company. Vast tracts of Canadian lands have been acquired to supply the tremendous needs of the company for its supply of wood pulp. The Nova Scotia

The Pump Shaft Must Have a Packing That Retains Its Lubricant Under All Conditions

For Steam (Superheat) and Compressed Air
For Water (Hot and Cold) Calcium Brine, Centrifugal and Reciprocating Pumps.
For Caustic Soda, Acids, Alkalis.
For Gasoline, Naphtha and all Distillates of Petroleum.

Pumps in the Paper Trade

handling chemicals and acids must have an abundance of lubricant that resists the cutting action of the fluids with which it comes in contact.

These packings give long, satisfactory service as their lubricant is especially compounded to meet the exacting demands of each particular service.

Send for a free working sample to test under your own peculiar conditions.

State size and quantity required for test.

Send for one of these charts to hang up.

Greene, Tweed & Co.

Sole Manufacturers

109 Duane Street New York

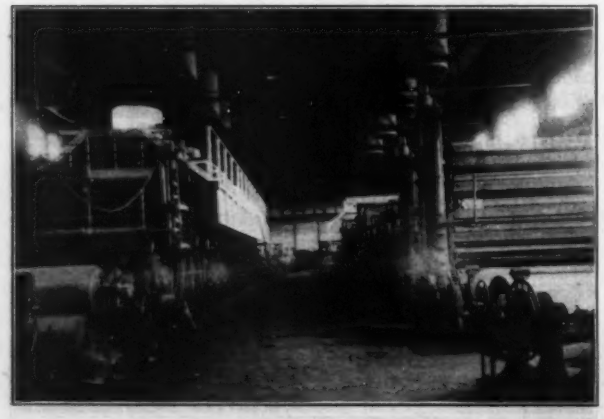
Wood Pulp and Paper Company, the Canadian enterprise, is operated as a subsidiary of the Scott Paper Company. Water power sites on the Medway River, capable of developing more than 15,000 additional hydro-electric h.p., are controlled by this Canadian organization. The Chester mill, ideally located on the Delaware River, affords low cost tidewater transportation of raw wood pulp and coal for power. The plant covers an area of 200,000 square feet on spacious grounds.

The company owns a fleet of seven lighters that are engaged in carrying its freight down the Delaware from Philadelphia ports to headquarters. Fixed properties were valued at the close of 1928 at net of $4,497,058, and this was considerably augmented by additional machines in 1929-1930 which will add another million or so to the equipment and power valuation. In the space of three years the Scott company has expended over $3,500,000 in advertising in the leading women's publications, as well as larger general magazines, and seasonal newspaper campaigns in the leading cities in the nation. The attention of the industrial and business field has been reached where the staff of industrial salesmen is finding more thought given to washroom comforts and convenience of employees. It is in this field where Scott tissue and Waldorf towels find the greatest market. A staff of fifteen engineers and chemists are engaged in making yearly improvements that bring progress and originality to the Scott company in its products and equipment, and keeping production cost at a minimum. In the period of seven years entirely new equipment in speedy paper machines and high power units have been added. It is in addition to being the first in use and patenting of many devices and methods of production, to try out new features on its machinery for experimental purposes. In summary of the success of the Scott Paper Company in a year of intense business depression, the factors that stand most prominently in the enterprise of the management are those of attention to low cost production and adequate equipment and efficiency of sales departments and plant workers by considerate and commendable financial returns for their efforts, common sense principles that worked wonders when applied under handicaps that seem unsurmountable in times such as those of the current year.

TOMAHAWK INSTALLS ADDITIONAL PAPER MACHINE

For the past several years the situation confronting the northern mills indicated clearly that efforts had to be made to find some new outlet for their goods, grocery bag and plain wrapping being gradually absorbed by the southern mills.

Switching to diversified products, however, changed operating conditions very materially, the greatest change noted being in the size and trim of the orders to be run. Whereas in former years the same grade and weight of paper could be left on the machine sometimes for days, the small tonnage in each grade at present requires numerous changes during twenty-four hours operation. This means loss in productive time.



VIEW IN MACHINE ROOM OF TOMAHAWK KRAFT PAPER CO.

SHOWING ADDITIONS TO TOMAHAWK KRAFT PAPER CO.

The pulp mill of the Tomahawk Kraft Paper Company, manufacturers of high grades sulphate wrapping and specialties, of Tomahawk, Wis., was originally built for a capacity of 160,000 pounds in twenty-four hours, whereas the rated capacity of the paper mill was 90,000 pounds. As the hydro-electric and steam power plants were adequate to take care of this additional requirement, the obvious remedy for the present situation seemed to be a proper balancing of the plant by bringing the paper capacity up to the capacity of the rest of the plant.

It was, therefore, decided to install an additional paper machine, with auxiliary equipment, such as beaters, jordans, electrical equipment, etc., which would give the company the looked for production. The installation is practically completed and it is expected to place the new machine in operation early this month.

The new machine is a Moore and White 152 inch Fourdrinier, trimming 142 inches. Incidentally, the original machine is a 132 inch Moore and White Fourdrinier, trimming 120 inches. The plant is also equipped with one 10 feet by 30 feet U-Bar Barking Drum, manufactured by the Fibre-Making Processes, Inc., of 8 South Michigan Boulevard, Chicago, Ill.

Added capacity of the mill will bring the Tomahawk output to 200,000 pounds in twenty-four hours, and will enable the company to handle a full line of goods in the trade in which it specializes.

Bids for Government Paper

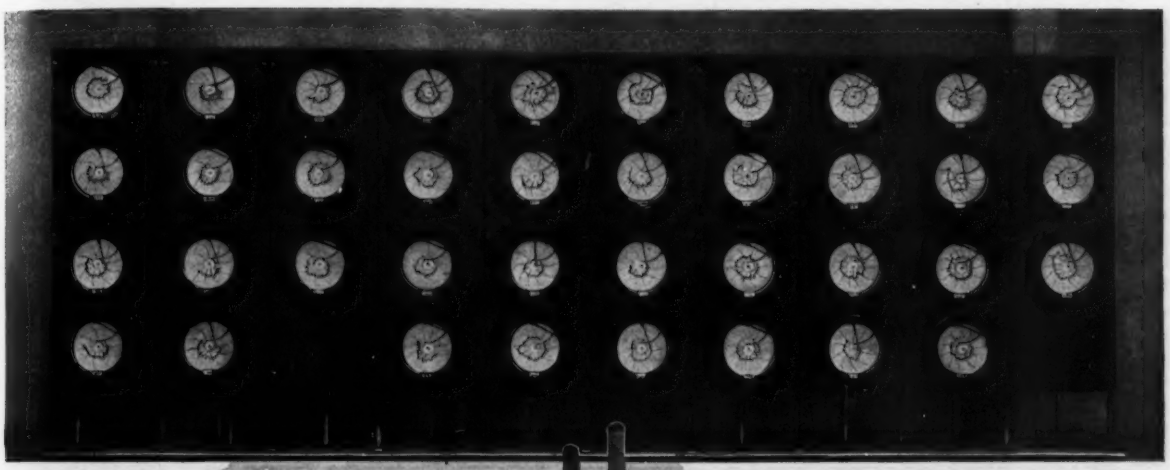
WASHINGTON, D. C., October 29, 1930—The Government Printing Office has announced the following paper awards:

The R. P. Andrews Paper Company will furnish 40,000 pounds (16,000 sheets) of No. 2 quality binders board at 3.5 cents per pound. Herbert J. Casey will furnish 61 pounds of tympan paper at 47 cents per pound. Bids for these two items were received on October 15.

Barton, Duer & Koch Paper Company will furnish 40,000 pounds of manila calendered tag board in 23¼-inch rolls at 7.2 cents per pound and the Tarentum Paper Mills Company will furnish 16,000 pounds (50,000 sheets) of 24 x 36 H. F. red sulphate paper at 7.25 cents per pound. Bids for these items were received on October 13.

The R. P. Andrews Paper Company will furnish 15,400 pounds (100,000 sheets) of 24 x 38, 50 per cent rag double coated book paper at 11.35 cents per pound, bids for which were received on October 10.

Charles G. Stott & Co. will furnish 3,000 sheets of 26 x 43 one side white sensitized paper at $42.17 per M sheets, bids for which were received on October 8.



38 of the 62 Brown Electric Flow Meters installed at the new Brown Paper Company, mill, West Monroe, La.

The new Brown Paper Mill, West Monroe, La.

Brown Paper Mill Measures Steam, Hot Water and Gas with 62 Flow Meters

Of the 62 Brown Electric Flow Meters installed at the West Monroe, La., plant of the Brown Paper Mill Company, 23 are of the indicating type and 39 are recorders. The latter are all equipped with Brown automatic recording planimeters, a special feature found only in Brown Flow Meters, by means of which a continuous flow record is maintained in volume units on the same chart with the regular rate of flow record. Thus the operator can read from the chart how many pounds of steam, gallons of water, or cubic feet of gas are delivered during any period. In the Brown Paper Mill these flow meters are used for measuring steam from boilers, steam for elevators, steam for turbo-pumps, hot water to various units, steam to fourdriniers, steam to evaporator, steam to caustic room, steam for feeder, and natural gas to furnaces. Write for Brown Electric Flow Meter Catalog and bulletins.

THE BROWN INSTRUMENT COMPANY
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Branches in 20 principal cities

To Measure is to Economize

Brown Electric Flow Meter

on the Inductance Bridge Principle

Paper Mill Superintendents Meet at Newark

NEWARK, N. J., October 25, 1930—The Annual Meeting of the Pennsylvania and New Jersey divisions of the American Pulp and Paper Mill Superintendents Association was held here today at the Hotel Douglas, with an attendance of over fifty registered for the day's sessions. The morning was given to an inspection of the extensive plants of the Heller & Merz Company, leading chemical and color manufacturers, who have been serving the pulp and paper industries for many years. The visitors were divided in groups, each headed by a guide experienced in his line of production and every opportunity was afforded to gain knowledge as to how colors and chemicals used in the industries were manufactured. After visiting the plants the return to the hotel was made where all were guests at a luncheon provided by the Heller & Merz organization. The afternoon was devoted to a business session during which an illustrated talk was given by Arthur L. Whiteside, of the Hill Clutch Machine and Foundry Company, of Cleveland, Ohio, relative to a new Friction Clutch, "the Hill-Pulvis Automatic Clutch," which his company has been developing for the past two years. At the close of his talk the meeting was devoted to open discussions of problems which confront the members in the manufacture of their respective products. The question of retaining flexibility in the product and the drying methods employed to obtain the desired results developed so many varying opinions that the session closed without any definite settlement of the problem. The most favorably considered solution advanced was the varying of the temperatures of the driers from the wet end to the dry end of the machine. The nominating committee reported the following as their selection for officers for the ensuing year: E. C. Gildengoff, chairman; C. H. Kephart, first vice-chairman; R. W. Shaffer, 2nd vice-chairman; and J. L. Mullin, secretary and treasurer. After dinner had been served, J. B. White, who was presiding, called on Carl Magnus, president of the national association, who extended the well wishes of the national body, outlining a program of work to be carried out during the ensuing year. He also made announcement that the annual meeting of the American Pulp and Paper Mills Superintendents Association would be held at Dayton, Ohio, on June 4, 5 and 6, 1931.

Among those present were:

E. C. Gildengoff, Congoleum-Nairn Company, Asbestos, Md.
H. S. Officer, Crane Company, Newark, N. J.
Thos. Ireland, Crane Company, New York.
A. L. Beals, Wilmington, Del.
Thos. J. Keenan, *Paper Industry*, New York.
R. G. Macdonald, TAPPI and PAPER TRADE JOURNAL, New York.
A. L. Whiteside, Hill Clutch Machine and Foundry Company, Cleveland.
J. H. Loomis, Heller & Merz Corporation, New York.
T. J. Walker, Heller & Merz Corporation, New York.
C. H. Kephart, York Haven Paper Company, York Haven, Pa.
H. C. Busser, York Haven Paper Company, York Haven, Pa.
Jacob Edge, Downingtown Manufacturing Company, Downingtown, Pa.
George Zeiss, Manhattan Rubber Company, Passaic, N. J.
H. H. Burroughs, Manhattan Rubber Company, Passaic, N. J.
Geo. W. Moore, Geo. W. Millar Company, New York.
Mr. and Mrs. J. Bertwell White, National Vulcanized Fibre Company, Yorklyn, Del.
Mr. and Mrs. Jos. H. Dow, Eastwood Wire Corporation, Belleville, N. J.
John W. Gregor, Jessup & Moore Company, Providence, Md.
Mr. and Mrs. Calvin S. Meixwell, Bartlett-Hayward Company, Baltimore.
H. A. Smith, Hammersley Manufacturing Company, Garfield, N. J.
J. Carl Schmidt, Dupont Company, Philadelphia.
Charles Ellis, Downingtown Manufacturing Company, Downingtown, Pa.
Mr. and Mrs. E. P. Stahl, Hyatt Roller Bearing Company, Newark, N. J.
Carl Magnus, Standard Paper Manufacturing Company, Richmond, Va.
Roy B. Underwood, Heller & Merz Corporation, Philadelphia.
W. J. Robinson, Keystone Lubricating Company, Philadelphia.
Wm. Robertson, Heller & Merz, New York.
A. R. Boyd, F. C. Huyck Company, Albany, N. Y.
J. Stepberger, Consolidated Paper Company, Bogota, N. J.
Ross Puette, Manchester Board and Paper Company, Richmond, Va.
J. L. Mullin, Jessup & Moore, Wilmington, Del.
Robert Knowles, Curtis & Bro., Mt. Holly Springs, Pa.
Mr. and Mrs. F. C. Farnsworth, Farnsworth Company, Conshohocken, Pa.
Mr. and Mrs. J. W. Raines, Lindsay Wire Company, Cleveland.
Wm. L. Nixon, Moore & White Company, Philadelphia.
H. C. Schewalber, Dill & Collins, Philadelphia.
J. L. Hodgins, *Paper Mill*, New York.
P. M. Loddengaard, Consolidated Paper Company, Bogota, N. J.
H. H. Jensenios, U. S. Rubber Company, New York.
Albert E. Ostergard, U. S. Rubber Company, New York.
Walter J. Harte, Noble & Wood Machine Company, Hoosick Falls, N. Y.
C. E. Robertson, Noble & Wood Machine Company, Hoosick Falls, N. Y.
F. A. Soderberg, General Dyestuffs Company, New York.
F. Fielding, Diamond Mills Paper Company, Bloomfield, N. J.
Mr. and Mrs. Thos. N. Rider, H. Waterbury & Sons, Oriskany, N. J.
R. Murgatroyd, J. W. Bolton & Sons, Lawrence, Mass.
E. Blosser, International Paper Company, New York.
H. J. Hoffman, General Dyestuffs, Philadelphia, Pa.
Miss Olga Lindstrom, A. A. Tanyane, PAPER TRADE JOURNAL, New York.

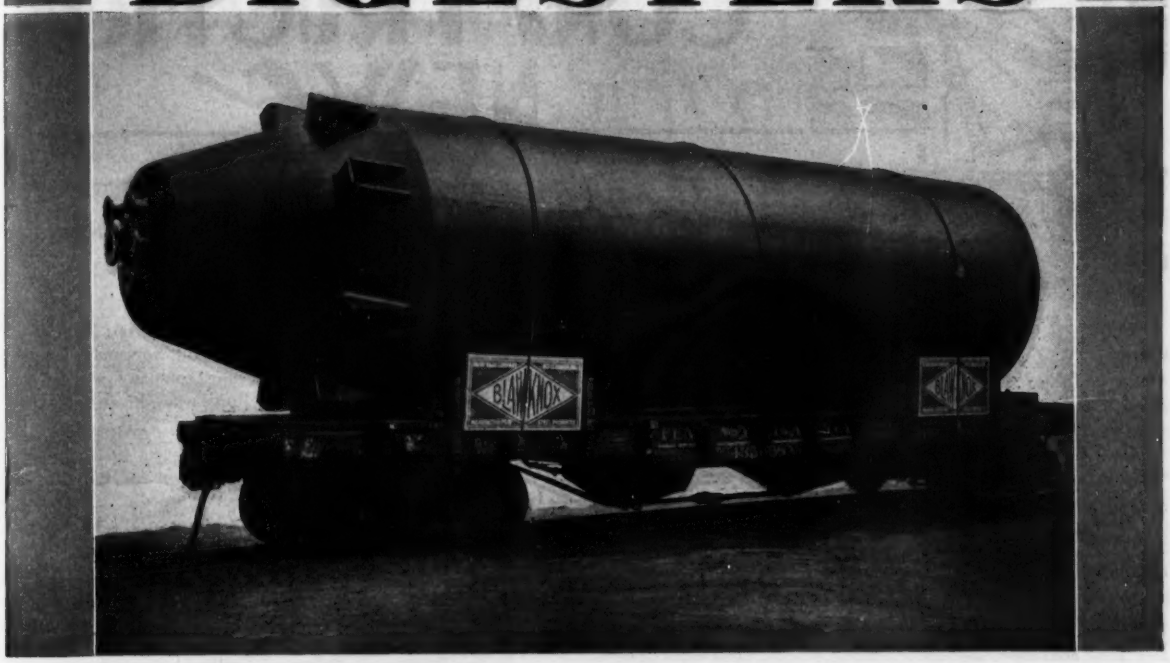
Paperboard Industries Fall Meeting

A complete report of the Fall meeting of the Paperboard Industries Association, held at the Drake Hotel, Chicago, September 23, 24 and 25, has just been issued from the association headquarters at 608 South Dearborn street, Chicago. At these meetings nominating committees for the Fall elections were selected. The Paperboard group named the following representatives to act on the Presidential Nominating Committee: Sidney Frohman, Hinde and Dauch Paper Company and N. H. Carpenter, Shenandoah Boxboard Corporation. Nominees from the Folding Box group were W. J. C. Karle, Karle Lithographic Company and H. H. Stonebarger, Globe Folding Box Company. Nominees from the Container group to act on the Presidential Nominating Committee were W. J. Cassady, Jackson Box Company, and T. H. Goodspeed, American Box Board Company. Group nominees to nominate group vice-president and members of the executive committee at the annual meeting in November were: Container: J. J. Brossard, J. L. Barchard, W. S. Hubbard, M. M. Madsom and T. C. Mitchell; Folding Box: Irving Randall, T. H. Goodspeed, W. G. Latham, F. V. Powell and P. A. Schilling; Paperboard: Irving Hill, Frank C. Ash, E. Victor Donaldson, E. R. Hankins and M. J. Lawless.

The various group meetings were characterized by splendid attendance and a number of interesting discussions. President Strange; I. W. McLean, Administrator; and Sidney Frohman, Chairman of the Board of the Trade Practice Division; Gilbert H. Montague; A. W. Luhrs; P. A. Schilling; Grafton Whiting, Statistician-Accountant; R. C. Fyfe, Chairman, Consolidated Classification Committee; and others appeared on the various programs.

The general program for the Annual Meeting in New York City to be held at the Commodore Hotel on November 18, 19 and 20 was also announced and approved.

DIGESTERS



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BLAW-KNOX FORGE AND HAMMERWELDED DIGESTERS are designed to comply strictly with the A. S. M. E. code for unfired pressure vessels.

They are forge and hammerwelded to withstand great pressure, and annealed in one piece to remove all strain. The result is a one-piece, bottletight, seamless, absolutely safe vessel.

Blaw-Knox guarantees every Pulp Digester against failure.

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Canadian Pacific Bldg., New York, N. Y.
London, England, New Oxford House, Hart St., Holborn, W.C. 1
Paris, France, 1 Rue DeClichy. Milano, Italy, 6 Via S. Agnese, 6
Dusseldorf, Germany, 17, Bismarckstrasse

BLAW-KNOX

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Finances and Operation of Paper Mills

Construction News

Menasha, Wis.—The Menasha Paper Corporation, Menasha, has completed plans and awarded a general contract to Anton Nielsen, East Forest avenue, Neenah, Wis., for extensions and improvements in rotary machine department, consisting of a three-story unit, 48 x 96 feet. Estimated cost has not been announced. Work will be placed under way at once. A contract for iron and steel work has been given to the Lakeside Bridge & Steel Company, Milwaukee, Wis. Carl A. Cajamus, Menasha, is engineer in charge.

Indianapolis, Ind.—Beach & Arthur, Inc., 221 West South street, manufacturer of paper products, has work under way on a new plant unit at 2900 Columbia Avenue, to be one-story and basement, estimated to cost about $80,000, with equipment. General contract was recently let to Harry Fitton, 958 North Pennsylvania Avenue, Indianapolis, who also acted as architect and engineer for the structure. Present works will be removed to new location as soon as the building is completed and the capacity increased.

Chicago, Ill.—Plans for a consolidation of interests have been arranged by H. Schultz & Company, 531 West Superior street, manufacturer of paper boxes and containers; the Star Paper Box Company, 450 North Hermitage avenue; and the Illinois Paper Box Company, 2309 South Keeler Avenue. A name is being selected for the consolidated organization, which will have three factories in Chicago, and one plant at Warsaw, Ind. The merged interests plan a general expansion and improvement program for increased capacity at different units.

Millwood, Wash.—In connection with proposed expansion program at the mill of the Inland Empire Paper Company, Spokane, Wash., at Millwood, near Spokane, it is proposed to rebuild and increase capacity of the sheet and roll finishing division. Other departments of the mill will also be remodeled and improved, with installation of additional equipment for larger output. The company is arranging for a bond issue of about $600,000, of which about $350,000 will be disposed of at once, and considerable portion of latter fund used for the development.

Rhinelander, Wis.—The Rhinelander Paper Company, Rhinelander, will proceed with construction of a new addition to its mill, for which general contract recently was let to C. R. Meyer & Sons, 50 State street, Oshkosh, Wis. It is reported to cost over $45,000, with equipment, and will provide for increased capacity at the plant. Foelke Becker is general manager.

Palatka, Fla.—Captain H. E. Ellis, Jacksonville, Fla., chief engineer of the Southeastern Development and Holding Company, is said to be interested in a proposed new paper mill to be located on Third street, Palatka, to be used for the production of paper and paper pulp from green fibre under a special process. It is understood that the project will mature in near future, when permanent name will be selected for the new organization. Initial estimated cost has not been announced.

New York, N. Y.—The Crescent Box Manufacturing Corporation, recently organized with a capital of $10,000, is said to be planning early operation of a local plant for manufacture of paper boxes and containers. The new company will be represented by Gerald G. Schwartz, 160 Broadway, an attorney.

Cleveland, Ohio—The Industrial Rayon Corporation, West Ninety-eighth Street and Walford Avenue, has filed plans for a new stack at its local viscose mill, to be used for the elimination of fumes. A general contract has been let to the Rust Engineering Company, Koppers Building, Pittsburgh, Pa. The structure will cost $47,415.

Burlington, N. J.—The Neidich Process Company, Burlington, manufacturer of carbon papers, etc., has completed a new addition to its plant to provide for large increase in output in all departments, including those given over to general typewriter supplies. The new structure is of multi-story type, and is said to represent an investment of over $75,000, with equipment. The company is a subsidiary of the Underwood Elliott Fisher Company, New York, which recently acquired the Waters & Waters Manufacturing Company, Pierce Building, St. Louis, Mo., also producer of carbon papers, etc., and which will be operated in the future in conjunction with the Neidich branch at Burlington, and which latter plant will be used for the bulk of output for the two operating units.

Chicago, Ill.—The Jefferson Paper Bag Company, 6525 Lorel Avenue, Clearing, Ill., recently organized with a capital of $100,000, is said to be arranging for the early operation of a plant in the Clearing Industrial District, for the manufacture of a line of paper bags and containers. The new company is headed by M. N. Miller and A. T. Roberts.

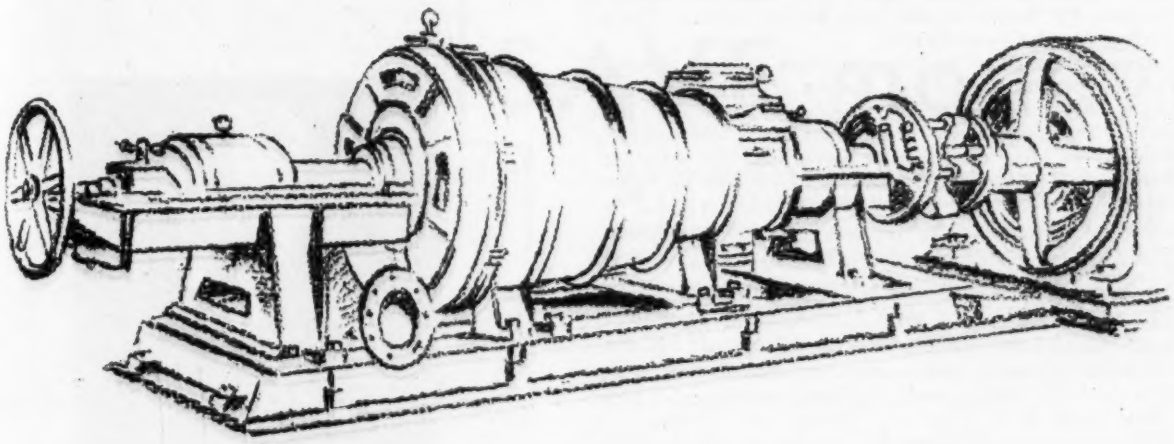
Montague, Mass.—The Keith Paper Company, Turners Falls, Mass., has plans for the construction of a new water treatment plant for mill service to be located at Montague, reported to cost over $25,000, with equipment.

Biltmore, N. C.—Raylaine, Inc., care of G. Jean Nord, Asheville, N. C., recently organized by Mr. Nord and associates to construct and operate a mill for the manufacture of fibre products under a special process, has plans maturing for the initial mill unit to be located at Biltmore, where a large tract of land has been secured. The new unit will be of brick and steel type, one-story, and is reported to cost over $400,000, with machinery and equipment, including machine shop, boiler plant and other mechanical units. It is expected to begin work within the next sixty days. Mr. Nord is president and general manager, and will supervise mill construction.

Chicago, Ill.—The Liberty Paper Box Company, Inc., 152 West Whiting street, recently organized with a capital of $25,000, proposes to operate a local factory for production of a line of paper boxes and cartons. It is understood that work will be placed under way at an early date. The new company is headed by Alexander and Frank Naples.

Seattle, Wash.—The Portland Canal Power Company, Dexter Horton Building, Seattle, which proposes to construct and operate

BOARD, BOOK, BOND AND LEDGER



From 100% rag bond to dump stock waste paper, makers of every grade of paper use Emerson Jordans. Equipped with Bolton Inverted Wedge Plugs and Timken bearings, Emerson Jordans cut repair and renewal costs, improve quality and uniformity and produce operating economies previously believed impossible to obtain. Built in 4 sizes, send for Bulletin and complete information, *no obligation.*

The EMERSON MANUFACTURING COMPANY
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4002

a hydroelectric power plant in Alaska, for paper mill and other industrial service, has plans nearing completion for initial unit to be located on the Davis River, on Alaska side of the Portland Canal, approximately twelve miles south of Hyder. The plant will be equipped for a capacity of 40,000 horsepower, and will be provided with a steel tower transmission system for service at different points in the vicinity, and as far distant as Stewart, B. C. Willis T. Batcheller, Inc., Dexter Horton Building, Seattle, is engineer for the project, which is reported to cost over $2,000,000.

New Companies, Etc.

Akron, Ohio—The General Paper & Notion Company has been incorporated with a capital of 250 shares of stock, no par value, to manufacture and deal in paper products of various kinds. The incorporators are E. M. Hoge, Louis and Samuel P. Friedman, 910 Second National Bank Building, Akron. The last noted is company representative.

New York, N. Y.—The Columbia Paper Specialty Company, Inc., has been incorporated with a capital of 100 shares of stock, no par value, to manufacture and deal in paper products of various kinds. The incorporators are Joseph Baron, 144 Manhattan Avenue, Brooklyn; and Seymour Kurantman, 515 West 158th Street, New York. The company is represented by Howard Bloom, 38 Park Row, New York, attorney.

Grand Rapids, Mich.—The Grand Rapids Paper Company, operating with a capital of $50,000, has filed notice of company dissolution under state laws.

Paterson, N. J.—M. Politinsky & Sons, Inc. has been chartered with a capital of 2,000 shares of stock, no par value, to deal in paper, paper products, etc. The incorporators are Irving and Jacob Politinsky. The company is represented by Nathan Friedman, 158 Market Street, Paterson, attorney.

New York, N. Y.—The A. Dashevsky Paper Company has been incorporated with a capital of $10,000, to manufacture and deal in paper goods of various kinds. The company is represented by Samuel List, 276 Fifth avenue, New York, attorney.

Philadelphia, Pa.—The Philadelphia Paper & Cordage Association, Inc., is being chartered by local paper and twine interests as an organization to advance the welfare and trade activities of companies engaged in the manufacture and sale of paper goods of various kinds, cordage, twine, etc. The new organization will be represented by Rupert C. Schaeffer, Jr., Harrison Building, Philadelphia, attorney.

Edward Beck Passes On

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., October 27, 1930.—Quite a shock to pulp and paper men throughout Canada—and to newspaper men as well—was the news a day or two ago of the sudden death of Edward Beck, secretary and manager of the Canadian Pulp and Paper Association. Mr. Beck died in the Royal Victoria Hospital in Montreal, where a few days previously he had undergone an operation for appendicitis. He was 63 years of age, and leaves a widow, formerly Annie S. Smyth, whom he married in Detroit, in 1891, and two sons, Norman E. Beck, of Atlanta, Georgia, and Frederick H. Beck, of Vancouver, B. C.

Mr. Beck, who at one time was one of the outstanding figures of Canadian journalism, was born in Hertfordshire, England, and came to Canada in 1879. In the following year, at the age of 13, he started work as printer's devil on the *Tillonsburg Liberal*, thus beginning what proved to be an ever widening experience, both mechanical and editorial, in newspaper work, which took him to St. Thomas, Utica, Rochester, and elsewhere until he joined the reportorial staff of the *Detroit News* in 1896, soon going to the responsible position of Washington correspondent of that paper. In 1898 he was recalled to assume the duties of city editor in succession to H. P. Hetherington, and for the following nine years he filled with much acceptance various higher editorial chairs on the news staff. In September of 1907 he entered Canadian journalism by way of the managing editorship of the *Montreal Herald*, going in a similar capacity to the *Montreal Star* in 1912.

Two years later he took the leading part in launching the *Financial Times* on what has proved to be a successful course, and in this connection he labored long and hard, even under the disadvantages of poor health. He believed, however, that Montreal was an attractive field also for a weekly devoted especially to Montreal activities, municipal and otherwise, at the same time treating general topics in a discursive and pointed manner. Thus *Beck's Weekly* was launched in March, 1914, and had great promise of popularity, but like many other enterprises, old as well as new, it withered before the blast of war. Mr. Beck then found other editorial activity for the next three years as editor of the *Winnipeg Telegram*, but in May of 1917 returned to Montreal, soon to become associated with the Canadian Pulp and Paper Association.

This organization sent him on a trip to study the pulp and paper resources of Sweden, Finland, Norway, Denmark, England and

EDWARD BECK

France. His reports and observations on this tour of inspection resulted, shortly afterwards, on the resignation of A. L. Dawe, in his appointment as secretary and manager of the association, a position he held with complete acceptance for the remaining nine years of his life.

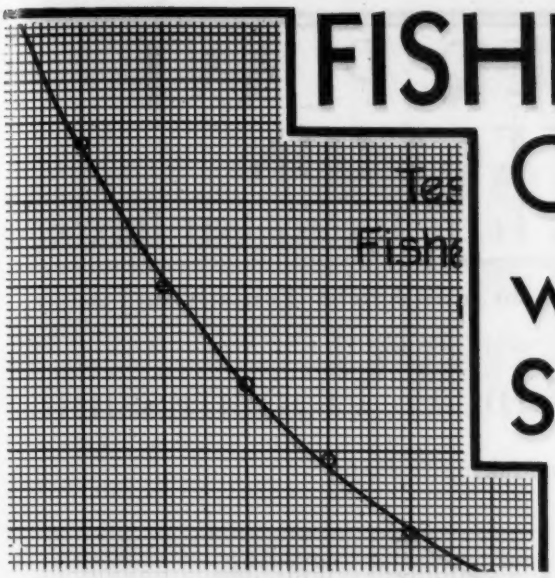
Under Mr. Beck's management, the association, in keeping with the growing industry, greatly increased its scope and usefulness, and among other things he gave great assistance to the executive in establishing the Pulp and Paper Institute in Montreal, the only building of its kind in the world.

Leading newspapermen, executives of various pulp and paper companies, and men from every walk of life assembled at the funeral service in Montreal, Canon Shatford, an intimate friend of the deceased, conducted the ceremony. Later the body was shipped to Detroit for interment in the Woodmere Cemetery.

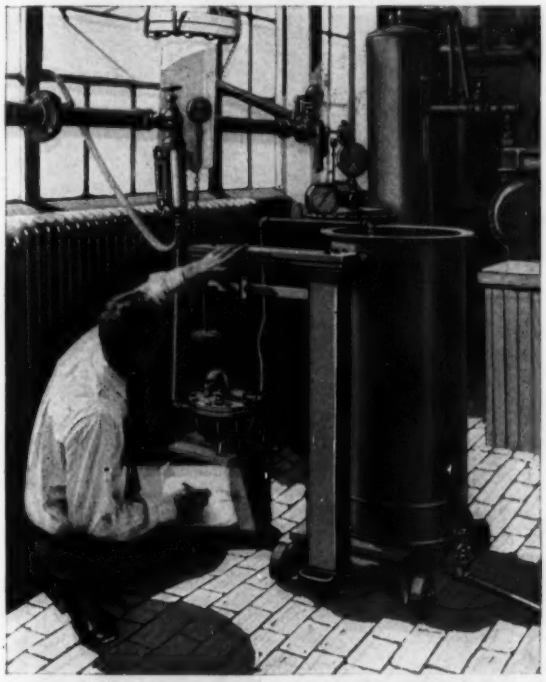
Creditors File Briefs in Colorado Mill Case

[FROM OUR REGULAR CORRESPONDENT]

DENVER, Col., October 25, 1930—Among the general creditors of the Colorado Pulp and Paper Mill Company are: George N. Sparling Coal Company; the Public Service Company of Colorado; Noble & Wood Machine Company; Beloit Iron Works; Lawrence Iron Works; Grimes & Friedman; Semirg Corporation; Stearns Rogers Manufacturing Company; Mine & Smelter Supply Company; the General Chemical Company; Crane-O'Fallon Company and the Colorado Rubber Company, and briefs filed by the parties named deny that they were parties to the stipulations dismissing bankruptcy proceedings against the company and permitting a sale of the concern.



FISHER Capacity Charts show where you can SAVE money



AN ENGINEER who uses many types of fluid control specialties told us this: "Since I have been using your capacity charts, I have discovered that the pressure governors, liquid level controllers, etc., I previously installed were all considerably oversize. Whenever I specified a specialty, I always stepped it up a size, because I knew the rated capacities were just estimates and I wanted to be sure it would be large enough.

"Now that I have these charts I am saving considerable money by specifying the smaller sizes that your tests prove will do the job." He might have added that more accurate control and longer life are also assured when the valve is working close to capacity.

Fisher Capacity Charts are taken from comprehensive scientific tests of each size and type of valve—they have nothing to do with the usual theoretical estimated capacities. The charts for steam, air, gas and liquids will now be gladly sent upon request to users of Fisher Specialties; they, of course, are applicable only to Fisher Specialties.

THE FISHER GOVERNOR COMPANY
2200 Fisher Building **Marshalltown, Iowa**

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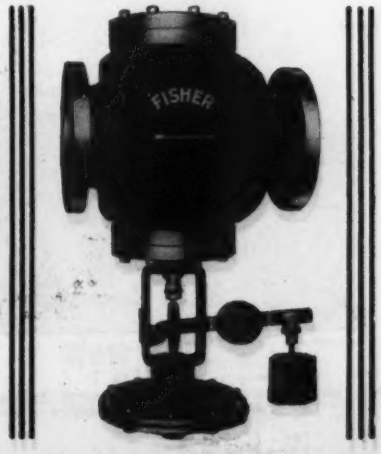
THE MARK OF SCIENTIFIC FLUID CONTROL

The Fisher Type 10-A Pressure Regulator is widely used for reducing the pressure of steam, air, oil and other fluids. It is particularly well suited to low reduced pressure service. It is simple in design and dependable in operation—there are no pistons and no dashpots to stick as a result of scale or corrosion.



POWER PLANT SECTION

REDUCING POWER COSTS THROUGH UNIT TREATMENT

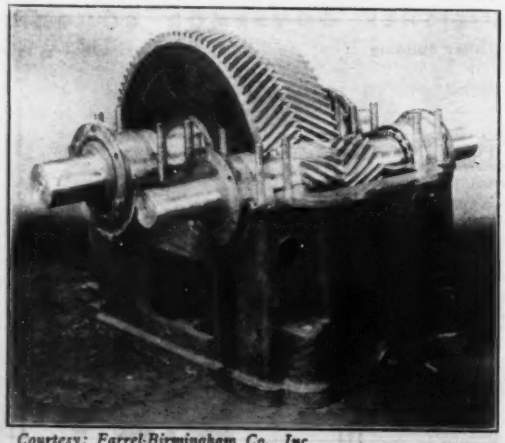
Conducted by Reginald Trautschold Consulting Engineer

Developments in Mechanical Transmissions

Of Interest to the Paper Making Industry

The mediums of power transmission by which the actuating power output of prime movers and lower units is made available to the power operated equipment of the mill; *i.e.*, the mechanical transmissions by which and through which the power supply is actually put to work, whether furnished by electric motors, by steam turbines or by some other form of power unit; are dominant factors in the economical operation of the mill. They may introduce wastes, power leaks, which discount to a considerable extent the economies effected in the conduct of the power plant, or, again, they may be capable of reflecting a very large proportion of the savings realized in the expense of power generation in the overall cost of the mill's output. It is a question of the mechanical efficiency of the power transmission medium whether the unavoidable toil be large or small, whether full advantage is taken of economies in power production or not.

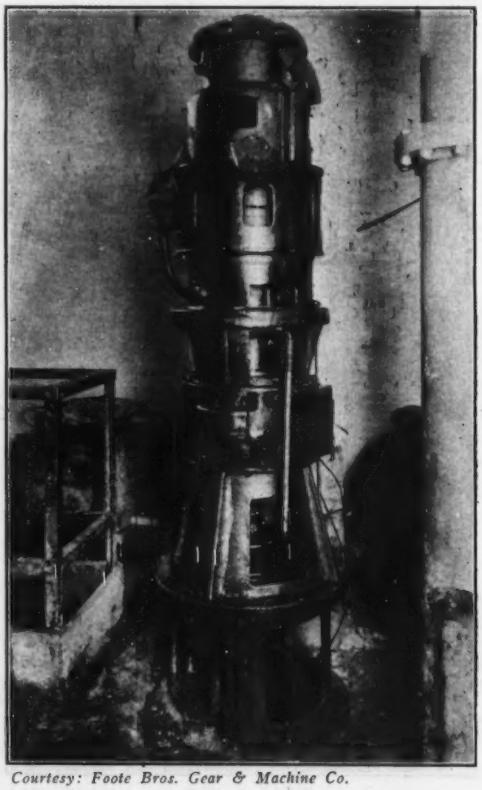
An inefficient transmission imposes an insidious tax upon the power plant and an even greater burden is imposed by any breakdown in the transmission. Two characteristics are essential, consequently, for a satisfactory transmission, good efficiency and marked reliability. The trends in the drive assemblages, in which the all important link between the actuating power unit and the driven equipment is the mechanical transmission, have been, hence, toward greater simplicity and higher mechanical efficiency, even though a somewhat higher initial investment be entailed than for a less dependable transmission of like or even higher mechanical efficiency.



Courtesy: Farrel-Birmingham Co., Inc.

FIG. 1

Modern herringbone, single reduction, speed reducer with cover removed, showing anti-friction bearing mounting.



Courtesy: Foote Bros. Gear & Machine Co.

FIG. 2

Compact, vertical type, motor-speed reducer drive assemblage.

The situation in respect both to greater simplicity and higher efficiency in mechanical transmissions, by which increased dependability and lower unit power costs have been attained, is common to virtually all lines of transmission units and some idea of what has actually been accomplished can be well shown by reviewing in brief a few of the outstanding developments in several of the more generally utilized methods of power transmission. While this will not give the complete story, it will serve to show that many mills capitalize on economies effected in the power plant and avoid some of the interruptions, at least, which formerly exacted heavy tolls.

Wood Pulp shot from Guns

with Steam from B&W Boilers

The Masonite Company of Laurel, Mississippi, successfully produce artificial wood through a process in which waste wood is exploded into a fluffy mass and then pressed into boards under heat. In this process wood chips are fed into one of a series of guns and saturated steam at 800 to 1,000 pounds per square inch pressure is admitted to the gun for a few seconds to soften the natural lignin or binder of the wood and to force the steam into the pores. A quick acting exhaust valve is then opened and the wood is exploded into the exhaust piping at atmospheric pressure. During the exploding operation full boiler pressure is kept on the gun to clear all the wood through the exhaust port and piping to a cyclone separator where the steam escapes to the atmosphere and the fibre drops into a chest where it is mixed with water.

In 1925 a Babcock & Wilcox boiler built to deliver steam at 1,200 pounds pressure was installed to operate the guns. Working under the tearing action consistently caused by the irregular load and discharging steam at 1,000 pounds into air at atmospheric pressure, this boiler served so well that when the plant was increased in 1928 another Babcock & Wilcox boiler of the same type was installed.

To date there are over 30 Babcock & Wilcox boilers either in service or in the process of manufacture that will deliver steam at 1,200—1,400 pounds pressure.

THE
BABCOCK & WILCOX
COMPANY

85 LIBERTY ST. NEW YORK, N. Y.

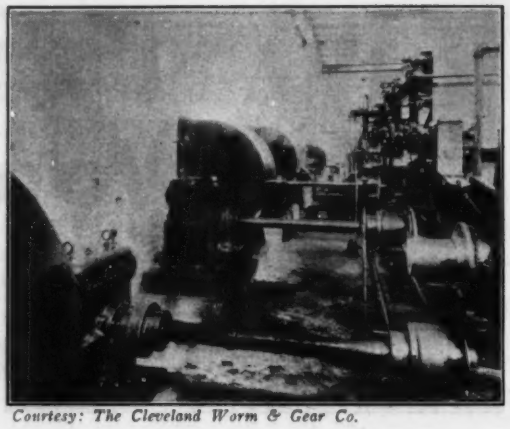
G-54

Gearing and Speed Reducers

The prime movers and actuating power units most frequently employed at the present time are electric motors or steam turbines, either of which is almost certain to rotate at a much higher speed than the drive shaft of the production equipment served, necessitating the interposition of some speed reducing transmission between the unit supplying the power and the unit utilizing the power. As the necessary speed reduction is usually quite large, some form of modern gearing, or its equivalent, is customarily incorporated in the transmission assemblage, and forms an essential feature thereof. If a train of gears is employed, it advisably takes the form of an enclosed speed reducer unit, such units representing the most efficient, convenient, dependable and actually the cheapest assemblage of gearing procurable.

These units, in their modern form, incorporate all the refinements and advance made in transmission gearing and the individual gear elements, running in oil and commonly mounted on antifriction bearings, operate under almost ideal conditions in respect to lubrication, alignment and safety. The quality of the gear members, operating under such very favorable conditions, with accurately formed gear tooth profiles and in delicate alignment, is reflected in the markedly high mechanical efficiencies of modern speed reducers, in some cases better than 99 per cent and quite generally in the neighborhood of 98 per cent.

Where the drive assemblage can be arranged conveniently so that the high and low speed shafts of the speed reducer unit are in line or parallel, the use of transmission units with gear members provided with herringbone or helical generated teeth has been quite pronounced of recent years, possessing as they do many desirable characteristics. The construction with herringbone teeth has been the more popular to date, but under certain circumstances the helical form of gears, suitably balanced, has proved even more satisfactory. The helical type speed reducer is somewhat better able to carry a pronounced thrust load, for with the herringbone construction an external thrust has the tendency to throw a large portion of the entire load on one helix, a situation which places undue wear and strain upon the loaded gear teeth. The chief advantage of the helical tooth arrangement, however, has to do with the heat treatment of the gears. The pinion members in either system, provided the pinion is cut integral with its shaft, can be quite accurately heat treated and hardened, but the heat treatment of the larger gears introduces complexities. With helical gear teeth, the necessary heat treatment and hardening can be consummated pretty successfully, but with the herringbone arrangement of gear teeth, the two opposed helixes introduce distortion difficulties which cannot be controlled as effectively. This is detrimental to the high efficiency characteristics possessed by the gear before it is heat treated, as the correct load distribution and rolling action of herringbone gears is very largely dependent upon the maintenance of the accuracy of the helix angles. The selection between suitable balanced helical gear speed reducers and herringbone units should depend, consequently, upon the available space, a helical unit of the same size having as much as 25 per cent greater power capacity, the wearing qualities desired and the requirements for strength.



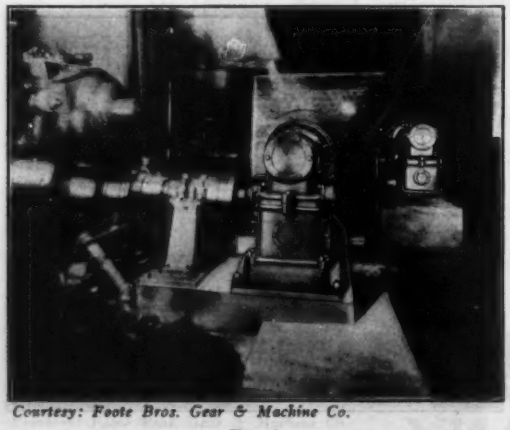
Courtesy: The Cleveland Worm & Gear Co.

FIG. 4

Worm gear speed reducers, drive all sections of paper machine at the Byron Weston Co., Dalton, Mass.

Where the drive essemblage can be more advantageously installed so that the axes of the high and low speed shafts of the speed reducer are at right angles, the familiar type of worm gear speed reducer, also incorporating the refinements of anti-friction bearings and flood lubrication, continue to be deservedly popular and highly satisfactory units. Great advance has been made in this form of high afficiency, power transmission, the worm member now being made practically glass-hard and then ground with the utmost precision as regards accuracy of thread contour, lead, pitch, etc. The measurable inaccuracies of the worms are held down to limits of 1/10,000 inch, in fact, adding greatly to the useful life of the units and producing a speed reducer of very high mechanical efficiency.

Modern speed reducers in general, of approved construction, possess pronounced qualities of ruggedness, strength, durability and long care-free life, all characteristics which serve to increase the dependability of the transmission assemblages in which they may be incorporated. They are also distinguished by freedom from virtually all vibration, when correctly installed, smoothness in power transmission and the ability to stand-up under severe



Courtesy: Foote Bros. Gear & Machine Co.

FIG. 3

Worm speed reducer transmission driving couch and drying rolls—Nekoosa-Edwards Paper Co., Port Edwards, Wis.

Courtesy: The Cleveland Worm & Gear Co.

FIG. 5

17.5 to 1 worm gear transmission drives saveall at Ste. Anne Paper Co., Ltd. Beaupre, Que.

for conveying PULPWOOD

DEMAND
A CHAIN
THAT LASTS

SIX STRANDS OF JEFFREY HERCULES CHAIN CARRYING PULPWOOD TO CHIPPERS

Any chain, to handle pulpwood satisfactorily, must be able to withstand the hardest kind of wear. Sliding in the conveyor trough and riding over the sprockets, it is subject to constant pounding from pulpwood, frequent jerks, exposure to weather, and day-in-day-out usage.

Because it more than fulfills these rigid requirements, Jeffrey Hercules Chain is the most popular chain in the pulp and paper industry for conveying pulpwood. It is also used extensively on bucket elevators and as a drive chain.

The malleable block links of Jeffrey Hercules Chain are made with a hard skin for wear and a tough interior to withstand pounding. Strap links are .40 carbon steel. The barrel of the solid link provides a long pin bearing—extra metal being added where barrel engages sprocket tooth.

D-shank design of the high carbon steel pins provides *full diameter* pins that are locked in the strap link, thus confining all wear to the long block link bearing. Full diameter pins substantially increase the strength of Jeffrey Hercules chains over chains using milled pins.

Chain Catalog No. 480-E gives detailed information about all Jeffrey chain and attachments. Free on request.

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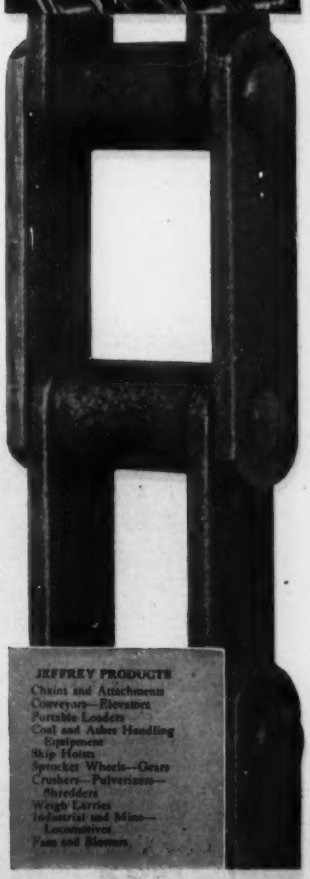
MATERIAL HANDLING EQUIPMENT



operating conditions subject to shock and trying overloads, advantages which tend to hold as well as to develop high mechanical efficiencies.

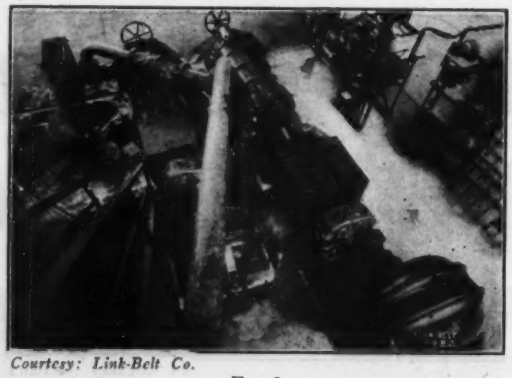
Installation Requirements

To secure full advantage of the high efficiencies attained by the modern speed reducer unit of precision necessitates, however, the accurate alignment of the power transmission with both the actuating power unit and with the drive shaft of the driven production equipment. Unless this is effected, the niceties realized in the construction of the transmissions are discounted to some extent and efficiency in transmission is sacrificed. For this reason, the actuating power unit, motor or turbine, and the speed reducer are generally mounted on a common bedplate, with the units connected by means of some approved form of flexible coupling. These connections, incidentally, constitute highly essential parts of the assemblages, if the high efficiency of the transmissions and dependability are to be realized. They not only provide the flexibility needed for the correction of any slight and virtually unavoidable misalignment, in erection or which may be developed in service, but also the necessary elasticity of transmission for the protection of both the speed reducer and the power unit against the strains of taking-up starting loads and other severe demands.

The connection of the transmission unit to the driving shaft of the production equipment is also very important, for while the rotary speed is usually very much less at this point than at the connection to the actuating power unit, the difficulties of attaining and maintaining good alignment are also much greater. Moreover, this second connection is the point at which the fluctuations in the power demands on the part of the driven equipment are advisably smoothed-out and the shocks incident to variations in the duties imposed in the production equipment can be cushioned to the best advantage. If good alignment can be effected at this crucial point and precautions can be taken to insure that the driven shaft will continue to run true, requirements which depend to a considerable extent upon the service conditions and the duties of the production equipment serviced and which can often be best provided for by mounting the drive shaft of the driven production equipment on anti-friction bearings of adequate capacity, the direct connection of the low speed shaft of the speed reducer to the driven equipment, by means of a suitable variety of flexible coupling, is quite common.

If alignment is good and the intensified strains in the operation of the driven production equipment are not too pronounced, such direct connection proves a highly satisfactory arrangement, but if the conditions are not so favorable and misalignment of shafts and accentuated strains on the connection are liable to cause premature wear in the flexible coupling, an excellent precaution to compensate in some measure for the more aggravated service conditions is to substitute a section of accurately finished roller-chain, preferably encased and running in oil, for the direct connection of a flexible coupling. Such chain drive adds considerably to both the flexibility of the connection and to its elasticity and ability to absorb shocks and to take-up sudden overloads. At the relatively low speed at which the chain travels, the efficiency of the connection is high and it is also a simple and comparatively inexpensive matter to change the sizes of the roller-chain sprockets should there be any need to alter the speed ratio of the transmission. As the chain section effects and controls the final stage of speed reduction, where the conditions of service discharged are least arduous, this ability to modify the delivery speed of the drive assemblage readily and over a considerable range adds greatly to the adaptability of the transmission as a unit.

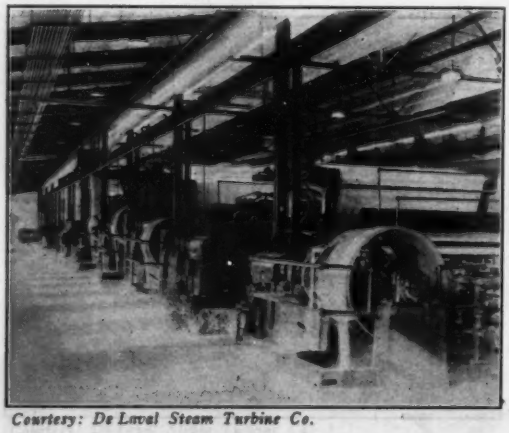
Another situation where the substitution of a chain section for the more rigid direct connection through a flexible coupling sometimes proves an advantage is where some other transmission device, such as a variable speed transmission fos the sensitive adjustment of the driven equipment's speed, is interposed between the actuating power unit and the high speed shaft of the speed reducer. Under such circumstances, a section of so-called "silent chain" is not infrequently used to link the variable speed transmission with the actuating power unit, in order to augment the elasticity of the transmission assemblage. The arrangement accomplishes this and without any appreciable sacrifice in the overall efficiency of the transmission assemblage, the link of silent



Courtesy: Link-Belt Co.

FIG. 8

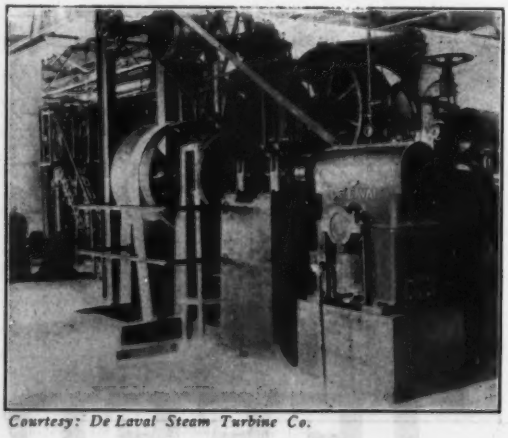
Herringbone speed reducers drive Jordan (at right) and refining engine (at left), speed ratios: 1.778 to 1 and 1.52 to 1 respectively—Warren Mfg. Co.; Riegelsville, N. J.



Courtesy: De Laval Steam Turbine Co.

FIG. 6

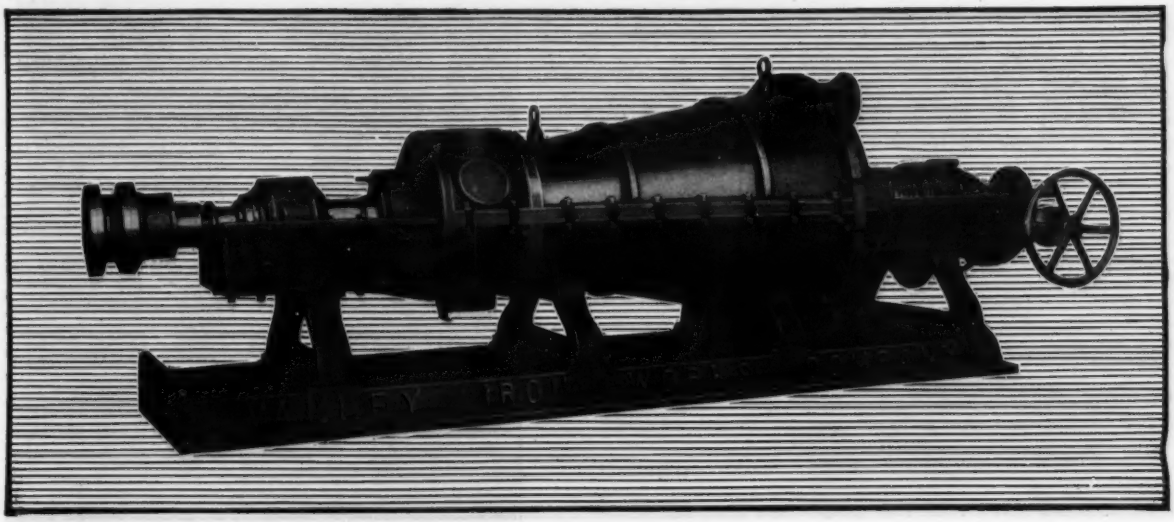
View from wet end of paper machine, showing worm speed reducer drives to couch, 1st, 2nd and 3rd press sections, two calenders and winder—Watervliet Paper Co., Watervliet, Mich.



Courtesy: De Laval Steam Turbine Co.

FIG. 7

Close-up of individual worm reducer drive showing flexible coupling connections—Watervliet Paper Co., Watervliet, Mich.



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No two mills are alike. Conditions vary all along the line—from raw stock to finished sheet.

The Valley Jordan is designed to meet varying mill conditions. It overcomes many of the disadvantages which have heretofore been common to Jordan engines.

Three decided advantages may be looked for in the Valley Jordan. *First,* a higher degree of all-around efficiency. *Second,* a material reduction in operation and maintenance costs. *Third,* longer life.

In other words, the Valley Jordan answers the big objective you are constantly striving for in your mill—*better paper at lower cost.*

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- Flat and Rotary Screens
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- Voith High Pressure Stock Inlets
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VALLEY

Equipment for Paper and Pulp Mills

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Canadian Representatives: Pulp & Paper Mill Accessories, Ltd., Montreal, Canada

chain having demonstrated its ability on test in such transmission to function at a sustained efficiency of 98.2 per cent.

The connection of the transmission to the driving shaft of the production equipment through a raw hide, or other non-metallic, pinion and gear combination is also resorted to at times, but such applications are governed for the most part by distinctly local requirements and present nothing very novel in the line of mechanical transmissions. They are noteworthy, nevertheless, for such pinions have proved both efficient and long lived when installed in gear trains and drive assemblages and under certain conditions unquestionably effect decreases in plant maintenance costs.

Variable Speed Transmissions

All varieties of variable speed transmissions, those of the mechanical, planetary and hydraulic varieties, by which the speed of the equipment they service can be sensitively controlled and adjusted over an extended range, without the necessity of stopping the equipment, have likewise been improved and further developed, as they have become recognized as essential units in an ever widening field of mill applications. For the sensitive adjustment of machine speeds to the different grades and weights of paper, for the automatic speed control of winders and rewinders, paper cutters, dryers and many other machines, they have become familiar devices in many mills, to control, set and hold the proper speed, at high, low or any intermediate point.

A recent development of note in connection with the mechanical type of variable speed transmission has been a veritably sealed unit to meet situations where abrasives, acids and other destructive agencies interfere with the satisfactory operation of the standard open type of unit. These completely enclosed variable speed transmissions require even less space for their accommodation and are constructed so they may be mounted in any desired position and operated from strategic points be remote control.

Incidentally, the advance in automatic and remote controls, electrical as well as mechanical, is doubtless the refinement of chief interest in connection with this line of power transmissions. A new electrical, automatic control, for instance, employs a small reversible, control motor mounted upon the frame of the transmission to actuate the shifting screw of the device through a suitable gear train. A two-way switch governs the operation of the control motor in either direction. To increase the speed ratio of the transmission, it is only necessary to throw the switch one way and to decrease the speed ratio to throw it the other way.

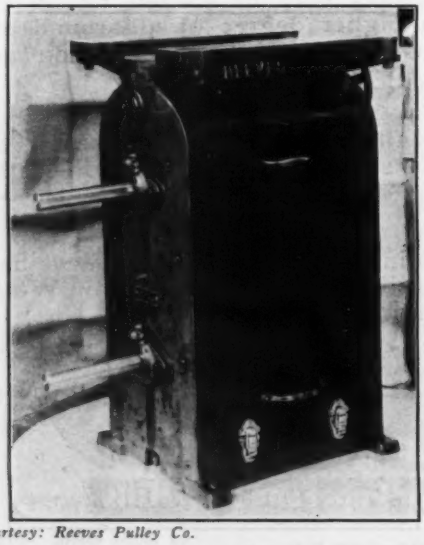
Courtesy: Link-Belt Co.

FIG. 9

Herringbone speed reducer operating stuff pump (speed ratio: 9 to 1) at Warren Mfg. Co., Riegelsville, N. J.

A solonoid brake automatically stops the control motor the instant the switch is returned to its neutral, off, position, after the desired modification in speed has been secured, and grips the motor shaft securely between adjustments of speed ratio. That is, when the control motor is inoperative, the brake is on and the speed ratio then pertaining is held constant. Throwing the switch in either direction to effect a speed adjustment, releases the brake before the control motor is energized and commences to revolve and a safety slip-clutch is provided to safeguard the control against the shifting screw locking at the limiting speeds of the transmission, should an attempt be made to force the device beyond its maximum or minimum speed limits.

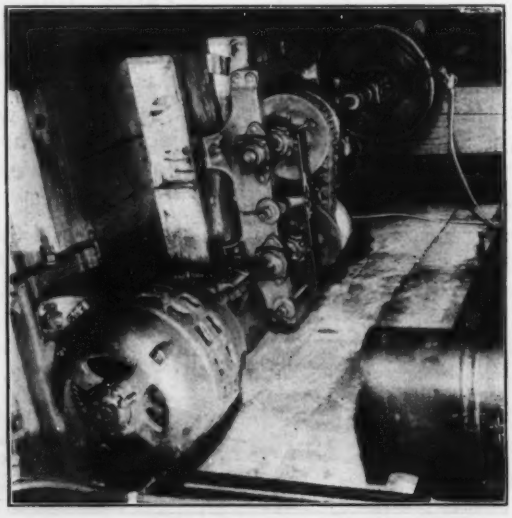
In remote control installations, a master switch with push-button



Courtesy: Reeves Pulley Co.

FIG. 10

Vertical type variable speed transmission, fully enclosed and equipped with motor base.



Courtesy: Lewellen Mfg. Co.

FIG. 11

Variable speed transmission between electric motor and electric generator.

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Increased Output
Lower Operating Cost

Waldron "Centennial" Embosser — open front type featuring easy changing of rolls.

Waldron Surface Printer for one and up to 16 colors, on luxurious papers and wraps.

THE industry-wide endorsement of Waldron Machines is the result of the combined advantages that their operation provides. With the specialized and practical knowledge of converting problems gained from over a century of leadership in this field, Waldron machines are especially designed to produce distinctive quality of finish and at the same time make production sufficiently profitable to more than offset the machinery investment.

WALDRON experience, engineering service and machine building facilities combine to provide the logical source for every embossing and printing requirement. Advanced Waldron features in machine design, speed and versatility in processing are aiding more and more manufacturers to not only improve products but to profit from new operating economies. There are interesting possibilities for your plant. Consider them with a view to stimulating new sales appeal through new finishes.

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Paper Converting Machinery

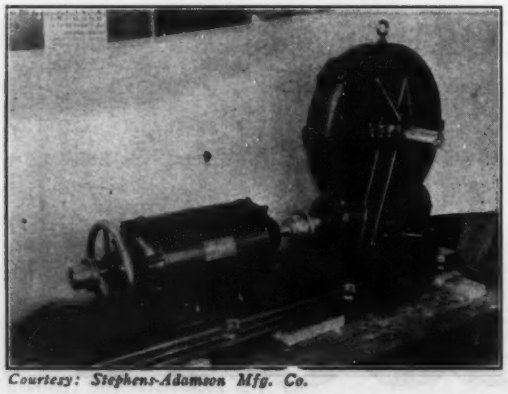
control stations is substituted for the two-way control switch, the control stations being situated at any desired points, in the vicinity of or removed from the drive assemblage, in strategic positions. Where two or more variable speed transmissions are equipped with these electrical remote controls, their respective transmission speeds can be altered in synchrony from a single master control station and each transmission may also be under the speed control of individual stations. A distinctive safeguard feature of this system of remote control is that should an operator continue to push a button after the transmission has reached its limiting speed, high or low, and the shifting screw no longer revolves, the safety slip-clutch functions and protects the control.

The automatic control of the mechanical variety of variable speed transmission as now developed makes the services of an operator to regulate and shift speeds unnecessary in certain applications. A uniform peripheral paper speed can be automatically maintained as the paper roll on a winder increases in diameter, for example, or the delivery speed of paper from an unwinding roll gradually decreasing in diameter can be kept constant. For such applications, the automatic control switch of the transmission is connected to an indicating device, such as a follower roll or floating roller, and the movement of the indicator is utilized to actuate the control switch of the shifting motor, the variation in speed of motor, in effect, replacing any shift of the indicating device.

Combining Speed Reduction and Speed Variation

A good deal of activity has also been apparent in the application of both the planetary and hydraulic types of variable speed transmissions to various services in pulp and paper mills, these devices combining in a single unit the characteristics of both a high efficiency variable speed transmission and a speed reducer of same capacity. In the case of the planetary type unit, however, most of the applications have entailed a speed ratio of such substantial value that the range of the single device has had to be augmented considerably by the incorporation in the drive assemblage of an auxiliary constant ratio speed reducer unit. Such supplementing unit, however, need not have as large a speed ratio as the reducer necessarily combined with a mechanical type variable speed reducer unit to secure a similar range of output speed. Systems of sensitive speed adjustment, both automatic and of the remote control variety, have also been developed for these high efficiency, planetary type, speed changers, greatly adding to their adaptability for exacting paper making process controls and extending considerably their fields of application.

In the case of the hydraulic type of variable speed transmission unit alone, the speed range of which extends from zero to a good many thousand lineal feet per minute, does it appear possible to avoid the necessity of employing an auxiliary speed reducer,



Courtesy: Stephens-Adamson Mfg. Co.

FIG. 12

Planetary type variable speed reducer and 90 to 1 worm gear speed reducer cuts down input speed of 900 r.p.m. to 1 to 6 r.p.m.

Courtesy: The Waterbury Tool Co.

FIG. 14

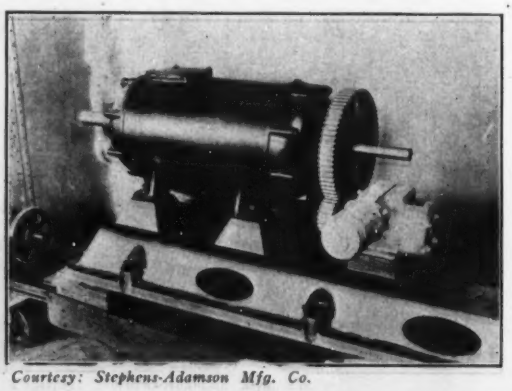
Hydraulic type variable speed transmission for variable speed line of 106-inch fourdrinier at the Strathmore Paper Co., governed by remote control. Power and variable speed units of transmission are separated and connected by piping, though in other installations the component units of the transmission may be adjacent.

in order to secure the required speed reduction in the drive assemblage. The single unit assemblage feature is chiefly characteristic of the modern hydraulic variable speed reducer, at least, and these transmissions are being used more and more in paper mills for paper machine drives, the sensitive speed adjustment and control of air dryers, calenders, winders and paper cutters. In winder service, these devices provide a range of speeds from the creeping travel necessary for threading in, up to the maximum speed which enables the winder to keep well in the lead of the paper machine. If necessary, the threading-in speed can be adjusted so that movement can scarcely be detected and from this up to the maximum permissible speed, every intermediate speed is available, in instant and exact response to any movement of the control. No matter how rapidly it is desired to bring the winder to full speed after threading-in, the acceleration is effected smoothly and without sudden strain upon the fragile sheet.

In paper cutter service, the speed control is reported to be so sensitive that the exact setting for any desired length of sheet is easily obtained, so accurately and positively that the margin left for trim can be made really negligible. So positive is the control, in fact, that the transmission may be fitted with a dial closely calibrated for length of sheet, a refinement which enables changes in setting to be made promptly and with the utmost precision. During the current year, this variety of hydraulic transmission control was applied to a duplex cutter, an individual drive operating each of the knives of the cutter. With this set-up, two entirely different lengths of sheet may be cut simultaneously and each cut to the required limits.

Transmissions of the Belt Variety

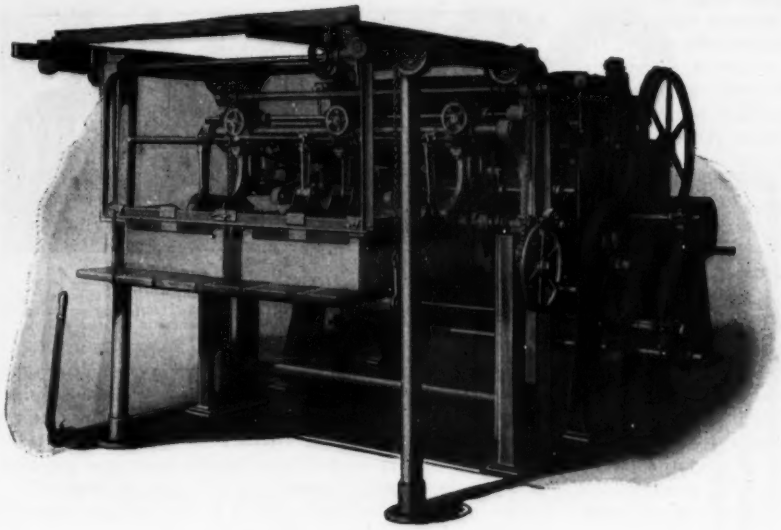
Where simply a low or moderate speed reduction is required between the power unit or driving shaft and the driven shaft of



Courtesy: Stephens-Adamson Mfg. Co.

FIG. 13

Planetary type variable speed transmission fitted with automatic remote control. Input speed, 1,500 r.p.m.; output speed, 137 to 600 r.p.m.



72 in. Single Moore & White Lay Boy and Cutter

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BY using M & W Lay Boys, the speed and output of the Cutters can be increased considerably beyond what is possible with hand laying.

At the same time, spoilage is reduced and the skill required of the operator is lessened. Wide sheets and multiple piles are handled without difficulty.

Paper is piled up to 36 inches high. The table is automatically lowered to maintain the top at a constant level. When the piles are 36 inches high the table may be picked up on a hand truck, and the machine restarted for fresh piles.

Sheet lengths up to 72 inches; any width. Write for full particulars.

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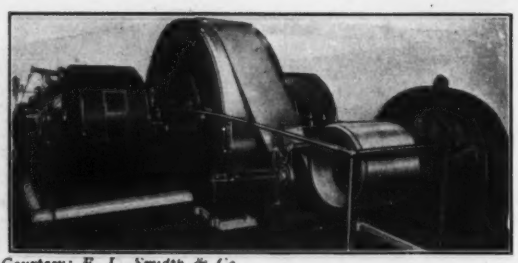
the production equipment and, also, where some stage, or portion, of the total speed reduction can be advantageously consummated by a link of belting, many efficient transmissions still employ the time honored driving belt, but generally in one of its modern forms, by which short center belt drives are made feasible. This does not mean that important developments have not also been made in the familiar open belt drives on longer centers, but the present trend is so decidedly towards the attainment of the utmost compactness feasible in power transmissions and high speed ratios are so commonly desired that the present review can advisably be confined to the consideration of belt transmissions which require relatively little space for their accommodation.

The disadvantages of long open belt drives, their substantial cost in many instances and the limitations imposed in the attainment of adequate speed ratios, where the speed differential between the velocities of the main driving and driven shafts is in any way marked, without complicating the drive assemblage by the addition of countershafts and a multiplicity of belts, need not be enlarged upon, it being sufficient to term them difficulties which have been largely responsible for the development of a number of short center belt drive systems well worthy of consideration. While this necessitates disregarding some interesting developments in the line of refinements in transmission belting, it should focus attention upon the classes of short center belt drives which have been found to be more satisfactory than ordinary open belt drives by many mills.

Short Center Belt Drives

One method of securing the necessary belt grip on the pulleys and an arc of sufficient belt contact to permit the pulley centers to be brought close together without sacrifice of drive efficiency, even with a gain in efficiency in many cases, and considerably larger ratios of speed reduction, is by the employment of a pivoted, belt wrapper pulley for snubbing the transmission belt about the driving pulley. A properly proportioned and correctly mounted device of this character, not only secures the increased belt wrap about the driving pulley which makes feasible the short belt center arrangement, even at relatively high speed ratios, but automatically adjusts the tension differential between the tight and slack sides of the driving belt to the load transmitted. The result of such adjustment is to increase the effective pulley wrap of the belt, hence its power transmitting capacity, as well as the power demands, increase with the load. Also, the arrangement permits the belt to be run at a considerably higher speed with safety than if it were employed on an ordinary open belt drive.

Unquestionably, the arrangement is distinctly adaptable and, planned and installed with proper attention to the requirements of the service, has been instrumental in effecting decidedly worthwhile savings and marked improvements in drive efficiency, as compared with drive efficiencies previously attained with open belt drives. Some of the accomplishments in these respects, in fact, can well be recorded, especially as instances can readily be cited which should interest many of the mills now operated with open belt drives and a complication of countershafts, mills which are more or less concerned with plans for changes provided substantial investment is not entailed.



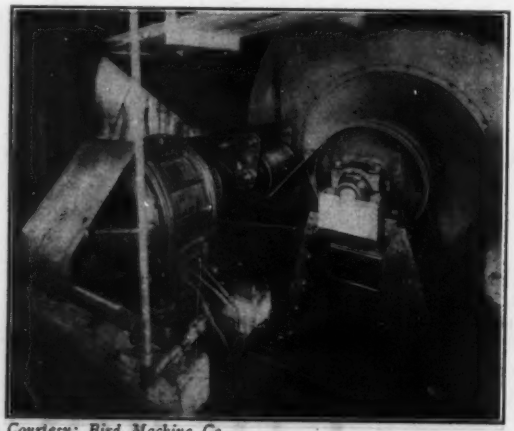
Courtesy: F. L. Smidth & Co.

FIG. 17

Short center, belt wrapper, drive replaced open belt effecting a saving of 62 feet of 22-inch double leather belting and increasing capacity of drive 25 per cent, attaining a drive efficiency of 98 per cent.

A typical case of a successful and profitable change from an open belt drive to one of these short center belt drives is exemplified in the experience of a western establishment confronted with the problem of increasing the capacity of its power plant to meet a stimulated demand for power and faced with the necessity of keeping expenditures at a minimum. No room was available for the installation of an additional generating unit with the existing engine room layout and the cost of an extension to the engine room seemed prohibitive. The engine room, however, housed an open, 22-inch, belt drive from a 300-horsepower engine to an electric generator, the drive spanning a distance of some 41 feet. By reducing the distance between the center of the engine's 114-inch driving pulley and the center of the 27-inch driven pulley on the generator to 10 feet, made feasible by discarding the open belt drive for a compact belt wrapper pulley drive, ample room was provided for the additional power generating unit.

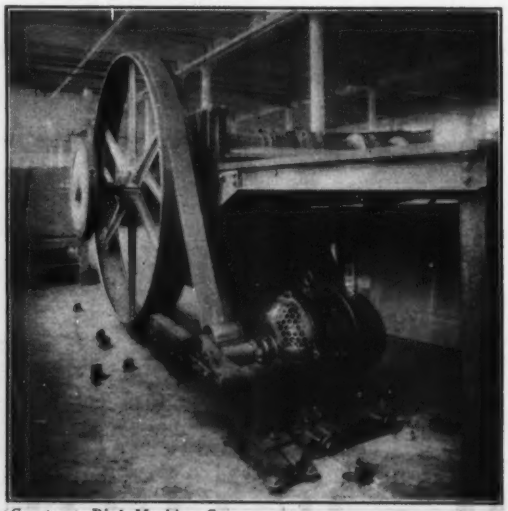
Making such alteration saved 62 feet of 22-inch, double leather, belting, the cost of which was actually more than the price of the necessary belt wrapper pulley drive equipment purchased. Furthermore, the capacity of the drive was increased 25 per cent and the



Courtesy: Bird Machine Co.

FIG. 15

50 hp. belt drive, 3-ft. 9-in. pulley centers, operating blower without slippage or appreciable belt wear.



Courtesy: Bird Machine Co.

FIG. 16

30 to 1 speed reduction effected by a short center, belt wrapper drive without slippage or sign of belt wear.

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That is the way we make WITCO products . . . with an eye to your profits and our re-orders.

Do business better by doing it DIRECT. We are first hands in supplying these materials.

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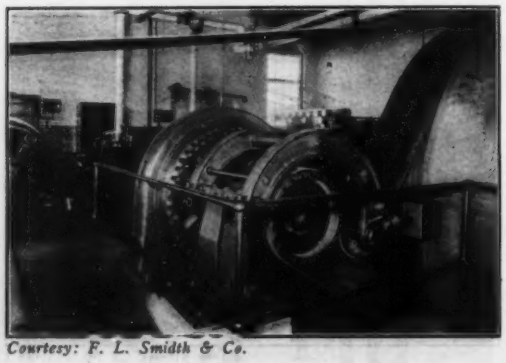
efficiency of the transmission brought up to the very respectable value of 98 per cent, while the upkeep expenses, by virtue of the automatic balancing of drive capacity, or belt wrap, to the power demands, were substantially reduced.

The adaptability of this distinctive belt wrapper, short center drive is also well demonstrated in a replacement drive installation, where formerly an open belt drive from a 10-foot engine pulley drove a lineshaft in an adjoining building, which in turn was belted to and drove a 120-kilowatt generator located alongside the engine. This cumbersome and roundabout drive was converted into a compact, short center, belt wrapper drive in which the lineshaft was eliminated entirely. The generator was mounted on a platform erected in the corner of the engine room in such close proximity to the driving engine that the horizontal center distance between the driving and driven pulleys of the transmission is a matter of only 5 feet 6 inches, despite the 10-foot diameter of the engine pulley and a generator pulley diameter only a shade under 17 inches. The vertical center distance between pulley centers is somewhat more, 7 feet 9⅝ inches, but even this keeps the entire drive assemblage well within the walls of the engine room and has permitted the bricking up of the opening formerly leading to the adjacent room, where the old lineshaft required for the attainment of the 7.84 to 1 speed ratio with the compounded open belt drive had been situated. An 18-inch double leather belt is used and the short center drive is reported to have given satisfactory service since its installation in 1922.

Still another and interesting application of this short center belt drive system was made some years ago in the engine room of a power plant, at that time severely taxed for space, where an additional generator had to be installed. In this case, the wide-face (52-inch) flywheel, 12 feet in diameter, of the main engine was utilized as a driving pulley, a 30-inch belt driving the main lineshaft of the mill, while a second 16-inch belt, also utilizing the flywheel as a driving pulley, drove a countershaft serving a generator. The main line shaft and the countershaft were situated on opposite sides of the engine, so the two belts utilized almost the full width of the wide flywheel. With this arrangement, the engine was loaded to only about two-thirds of its rated capacity, so enabling it to supply the additional power required for driving the extra generator, for whose accommodation space had to be provided.

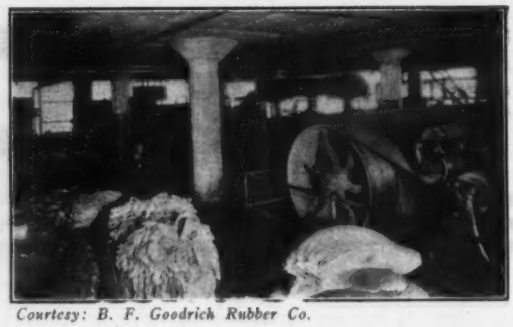
This space was secured in a very ingenious way. A third, double leather belt, 20 inches wide, was installed on the engine flywheel-driving pulley under the 16-inch belt driving the countershaft and was incorporated in a short center, belt wrapper drive on a 10-foot horizontal pulley center distance, the new 150-kva. generator being placed between the engine flywheel and the countershaft, and between the upper and lower runs of the countershaft belt. A speed reduction of close to 6 to 1 is secured and the drive has proved both efficient and satisfactory.



Courtesy: F. L. Smidth & Co.

FIG. 19

Short center, belt wrapper drive assemblage accommodated runs of countershaft belting connecting drive engine and remote countershaft.



Courtesy: B. F. Goodrich Rubber Co.

FIG. 20

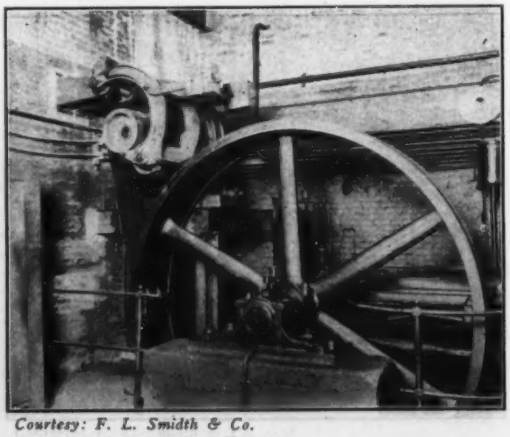
Short center, belt wrapper, drives operating beaters at the Riverside Mill of the Albemarle Paper Co., Richmond, Va. One belt has been in service 3½ years, another 2½ years, a third for 2 years and a fourth was put in service 6 months ago.

These particular examples of belt wrapper, short center drives have been selected and featured, not as models of freak installations, but rather to draw attention to the adaptability of this system of mechanical transmission and to show how awkward situations, liable to develop in many of the mill plants erected a decade or more ago, can be circumvented. In each case, the unusual drive assemblage has proved to be as satisfactory as more customary arrangements of similar short center belt drives and, as is general with these distinctive short center belt drives with belt wrapper control and regulation, has shown marked driving capacity and good transmission efficiency.

Multiple V-belt Drives

The now quite familar multiple v-belt transmission is another system of belt drive by which short pulley distances and high speed ratios, comparatively speaking, are being attained. A properly proportioned and installed drive of this variety secures its high tractive capacity, which allows the driving and driven pulleys, or sheaves, to be brought close together, by its distinctive and large area contact between the individual belt strands and the transmission wheels. This large contact area is secured, not by an increase in the belt wrap, or arc of contact, about the sheaves, as in the case of the belt wrapper, short belt center system, but by reason of the individual v-belt strands contacting with the sloping sides of the sheave grooves and securing by so doing very much greater contact area for a given wrap than a flat belt of like width.

It is this substantial increase in contact surface area, rather than the wedging action of the belt strands in the sheave grooves, that is chiefly responsible for the high tractive capacity of the modern multiple v-belt drive. The wedging of the belts in the



Courtesy: F. L. Smidth & Co.

FIG. 18

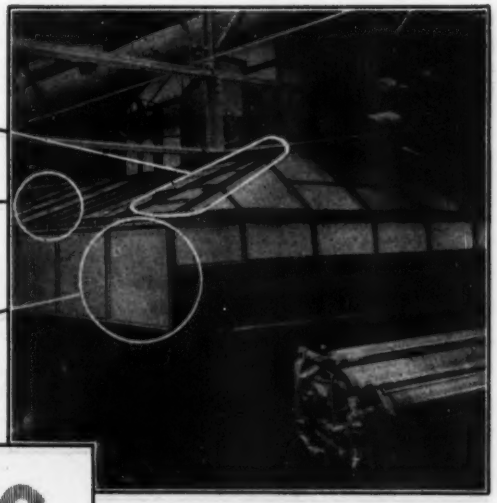
Compact belt wrapper transmission replaced compounded open-belt drive, eliminating former line shaft and conserving much valuable space.

More and more machines are being hooded, now that hoods with these features are available

Built of Johns-Manville Transite Asbestos Lumber.

Removable Panels — Built Complete Before Shipping.

Deep Side Curtains That Can Be Raised Or Quickly Removed.



THE three distinguishing major features of the ROSS Hoods combine to prevent damage from fire; deterioration from rust and acid; they insure utmost saving of time and labor for erection; they provide easy access at any time to dryers and rolls.

With its removable panels built complete in our shops before shipping, a Ross Hood can be erected over the week-end shutdown. Ask us to send full description and details.

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International Paper Co.
Island Paper Co.
P. H. Glatfelter Co.
*Maine Seaboard Paper Co.
Marshall Bros. Inc.
Monadnock Paper Mills
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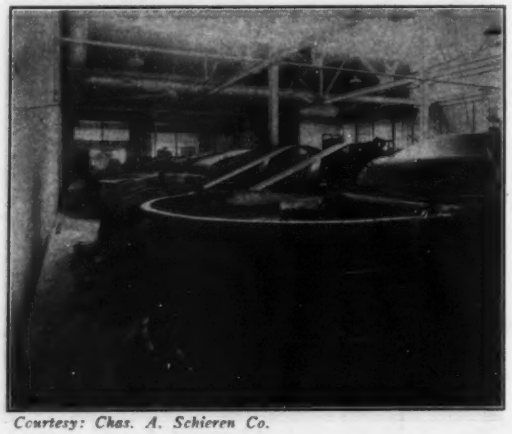
sheave grooves serves primarily to insure and maintain positive intimacy in belt contact, at the same time providing a quality of elasticity which assists in the smoothing out of fluctuations in load. Possibilities of belt slippage are virtually eliminated, furthermore, by the fact that any increase in load is met with a more intimate gripping of the sheave grooves by the individual belt strands as they are drawn deeper in the sheave grooves and the lateral pressure of the somewhat resilient belt strands on the sides of the sheave grooves increases.

In this form of belt transmission, the relatively great thickness of the individual belt strands imposes the need, in the fabrication of the belts, of imparting qualities to the construction which will provide adequate belt flexure when, in service, the belts run about the sheaves which usually differ considerably in respect to diameters. The fact that the belts are made endless so far as possible is some aid in this connection, as an initial wrap curvature is given to the belts as they are made up, but the ability of the belts to flex satisfactorily about small diameter sheaves is chiefly a question of belt construction. To secure this



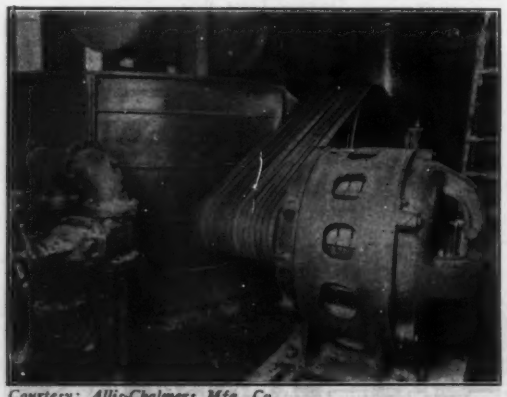
Courtesy: Chas. A. Schieren Co.

FIG. 21

Short center, belt wrapper, drives, waterproof leather belt, installed in 1918 at the A. P. W. Paper Co., Albany, N. Y.

important characteristic, quite distinctive constructions have been evolved by different belt manufacturers.

When a v-belt flexes about a sheave, the wider, upper portion is under tension and the narrower, lower portion under compression. At some point between is the so-called neutral section, at the axis of which neither force is present. This situation is taken advantage of to produce a belt which does not twist or buckle appreciably in the sheave grooves and which will travel true on



Courtesy: Allis-Chalmers Mfg. Co.

FIG. 23

100 hp. multiple v-belt transmission drive at the Tumwater Paper Mills Co., Tumwater, Wash.

Courtesy: L. H. Gilmer Co.

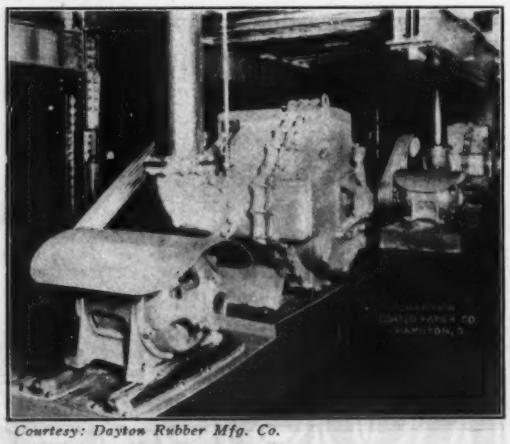
FIG. 22

Section of v-belt showing construction.

both the slack and tension runs. In one approved make of v-belt, layers of unusually strong cords, impregnated and imbedded in tenacious rubber friction, are arranged about the neutral axis for the transmission of the load, without stretching or appreciable internal friction. Above and below this neutral section, the belt material is a wear-resisting rubber of distinctive qualities. The tougher rubber in the upper, or tension, section is compounded to withstand repeated flexure and tension, while the somewhat more flexible rubber used for the lower portion is compounded to resist compression primarily. In the larger belts, bias-reinforcement cords are inserted in the tension section to provide lateral stiffening against buckling. The component fabrics and rubber compounds are then surrounded with jackets of rubber-impregnated, wear-resisting duck for protection and the built-up belt is finally vulcanized into one solid, somewhat elastic, mass. The fabrication of the belts, furthermore, is consummated in accurate metal moulds to insure precision in dimensions and form.

In another make of v-belt, the accommodation of the compression strains in the lower belt section, which are the chief cause of belt twisting and buckling in the sheave grooves, is affected by a series of corrugations in the bottom surface of the compression section. That is, the bottom of the belt, instead of being a plane surface, is a cogged surface, the side profile of which resembles a gear rack with rounded teeth. This construction gives the belt marked flexibility and prevents its buckling when it is flexed about the sheaves.

Whatever the distinctive construction of approved forms of v-belts, multiple v-belt drives are highly efficient, on service tests developing an efficiency of very close to 99 per cent, distinctly of the short-center drive class and are successfully operated at speed ratios of as high as 10 to 1 in single reduction installations and 64 to 1 in double reduction assemblages. The drives are very adaptable and virtually every variety of power driven machine in use in paper mills has been satisfactorily driven by transmissions of this variety; paper machines, jordans, beaters, screens, chippers, barkers, calenders, all kinds of pumps, fans, conveyors, etc.



Courtesy: Dayton Rubber Mfg. Co.

FIG. 24

Multiple, cogged, v-belt transmission driving vacuum pump at the Champion Coated Paper Co.

New Precision Model Williams Freeness, Beating and Consistency Tester

Features–

AUTOMATIC Stopwatch Control. Turning Lever Starts Flow also Starts Watch, Both Instantly Stopped by Reversing Lever. Merely Read Seconds Elapsed.

EASY TO OPERATE, Even by Those Without Technical Training.

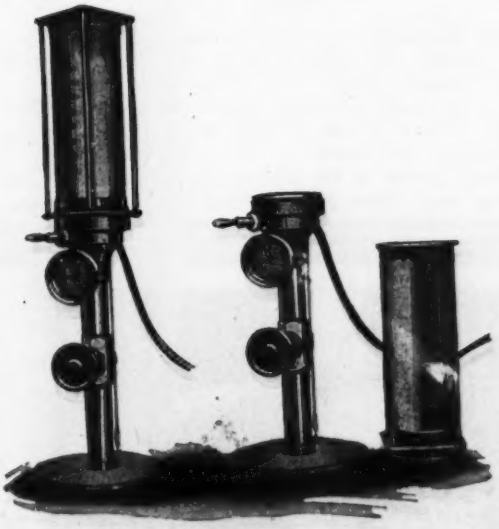
WIDE RANGE. Covers All Stocks From Grease Proof to Kraft.

GRADUATED CYLINDER

Easily Removed Leaving Sample on Loose Screen. Press, Dry, and Weigh Giving **Consistency** of any Wet Stock.

BEST AND QUICKEST

Known Method for Fibre in Whitewater Use Suction. Hand Made Sheets, Color Tests, Etc.



Bigger and Better Runs, Due to Uniform Grinding, Beating and Refining, will Buy This for You.

WILLIAMS APPARATUS CO., Watertown, N. Y.

EFFICIENCY MULTIPLE V-BELT DRIVE

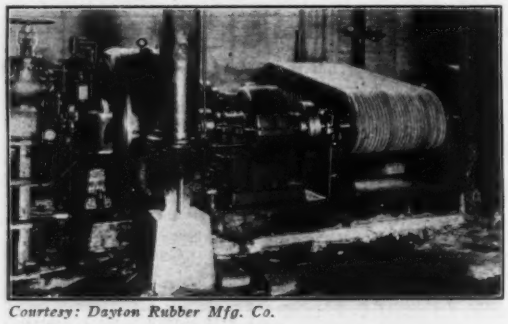
Run	Motor Speed, rpm.	Dyn. Load, lbs	Volts	Amperes	Dyn. hp.
6	1,621.5	1,055.5	223	15.2	3.03

Allis-Chalmers Manufacturing Co.
Efficiency of motor under test load, 0.674.
Motor output, (223 x 15.2 x 0.674)/746 = 3.062 hp.
Efficiency of drive, 3.03/3.062 = 0.989.

A Built-Up Flat Belt of Interest

Short center belt drives of high efficiency and quite respectable speed ratios have also been secured with a distinctive variety of flat, built-up, belting, which secures its high tractive capacity, not by a substantial increase in area of belt contact surface, as is customary with other varieties of belting suitable for short center belt drives, but by an improvement in the other major controlling factor, the coefficient of belt friction. This distinctive belt consists of a single or double leather, multiple ply Balata, or rubber belt backing to the pulley side of which are attached narrow, longitudinal strips of soft, green and pliable leather possessing a very high coefficient of surface friction.

These strips are riveted to the backing by hollow, deeply clinched rivets, forming cup-like depressions in the soft leather strips and thus guarding against the belt riding on the metal rivets



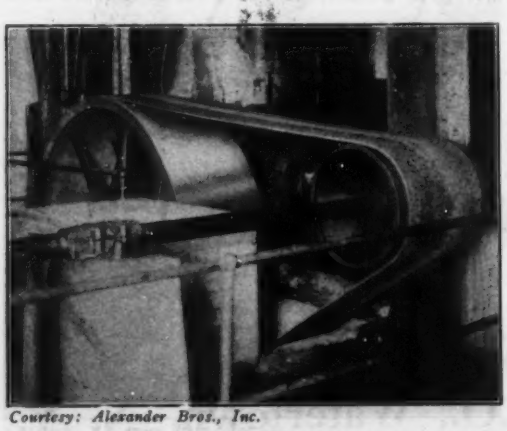
Courtesy: Dayton Rubber Mfg. Co.

FIG. 25

500 hp., multiple, cogged v-belt drive from main turbine to paper machine lineshaft.

and breaking the tenaceous grip between the green leather strips and pulley surfaces. The backing carries all the tension strains and the air channels between the friction strips eliminate any possibility of air pockets forming between the belt and pulley, even at the very high speeds at which the belting may be run, 7,000 or 8,000 feet per minute.

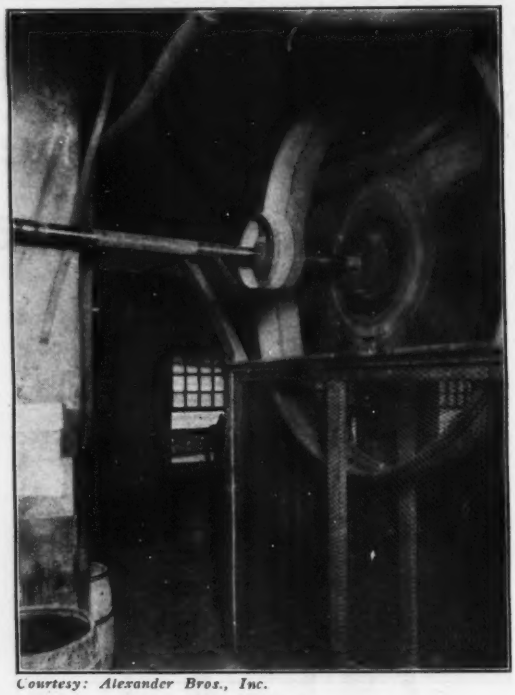
This radical departure in flat belt construction makes it possible for the belts, made endless so far as feasible, to operate successfully on short pulley centers and at high speed ratios, at efficiencies bettering 98 per cent. The backing being relatively



Courtesy: Alexander Bros., Inc.

FIG. 26

Short center, built-up, flat belt beater drive transmitting 200 hp. at a belt speed of 2,000 feet per minute.



Courtesy: Alexander Bros., Inc.

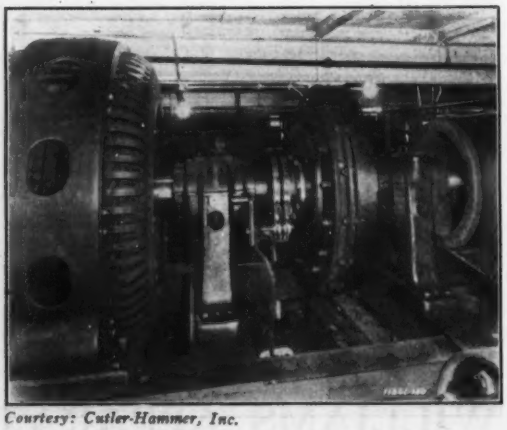
FIG. 27

Short center, built-up, flat belt transmission having speed reduction of 12 to 1.

thin and separated from the pulley surface by the thickness of the friction strips, a minimum of internal belt friction due to flexure is developed, the effect of which is especially advantageous in short center drives.

Elasticity and Flexible Connections

The transmission efficiencies of these several systems of modern, short-center belt drives are of decidedly high order and, when the belts are correctly proportioned for the load demands and requirements, can be held at and even above 98 per cent. Such attainment, obviously, leaves really very little to be desired in this important respect and, if the required ratios in speed reduction can also be secured, these belt drives require little space for their accommodation. Their high efficiency also permits their incorporation in compounded transmissions without appre-



Courtesy: Cutler-Hammer, Inc.

FIG. 28

Double engagement magnetic clutch connecting 500 hp. motor to line shaft serving five beaters, five jordans, five stock pumps and five agitators.

SHENANGO ■ PENN ■ CENTRIFUGALLY CAST BRONZE

A SUPERIOR BRONZE ALLOY FOR EACH OF YOUR ROLL CONDITIONS » » » »

Uniform crystalline structure . . . tough, durable, acid resisting compositions . . . when you require them.

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ciable sacrifice in overall efficiency, where speed reducers, etc. effect the major speed reduction. They also possess the very desirable characteristic of imparting elasticity and shock absorbing properties to the drive and their marked flexibility discounts to some slight extent the need for alignment precision in connections.

Where speed reducers are employed, alone or in combination with other transmission units, the necessity for a certain amount of elasticity of drive, which is distinctive of belt transmissions, is met more or less successfully by the use of flexible couplings, the employment of which is also essential for alignment requirements in direct connections. These flexible connectors, or couplings, are procurable in many forms and varieties, incorporating springs, various arrangements of resilient materials, pins, solid and bushed or of the laminated variety, rubber and leather discs, etc., but each type has its individual characteristics and the correct selection of a coupling for a specific service is a matter of a good deal of concern.

Strong and Long-Wearing

Among the several approved couplings for connecting the actuating power unit to the high speed shaft of the transmission is one formed of rigid flanges which engage an intermediate driving disc of some resilient material, such as leather or rubber. This coupling is strong and long-wearing and is suitable primarily for high speed service, for drives of moderate and light power demands, not subject to heavy pulsating loads. For more exacting drives, on high speed service, and generally for connecting the low speed shaft of the transmission to the driven equipment, the familiar steel-pin, rubber-bushed coupling proves, ordinarily, an excellent choice. The driving pins are removable, making it a simple matter to remove and renew the rubber bushings, an operation which can be done without disturbing the couplings on the shafts or having to realign the shafts. Clutches with laminated steel pins also prove quite generally satisfactory.

Where a clutch has to be used, the simple, efficient and distinctly convenient magnetic clutch is rapidly becoming the general favorite and is considered, doubtless, the most desirable. It requires even less space for its accommodation than any form of mechanical clutch, and, its chief advantage, may be operated from any one of several points. The operating switch may be located almost anywhere, in fact, as may also the individual control stations. To engage or disengage such a clutch, it is only necessary to turn the energizing current on or off and the operation is consummated without other manual effort. The clutches provide smooth, positive acceleration and are not burdened with heavy maintenance or upkeep expenses.

These accessories, quite as much as the power transmission units proper which have been briefly discussed, are important links in mechanical transmissions. In fact, it is from such units, large and small, that are built-up the transmission assemblages and systems upon which the efficiency and effectiveness in the utilization of power in the production mill must depend.

Trend Toward More Efficient Mediums

Developments in the mechanical transmission of power have kept well in step with advance in power generation and utilization during recent years and the need of a continuance of such balance should be recognized and appreciated by every progressive pulp and paper mill. The trend at present is very decidedly towards simpler and more efficient mediums of power transmission, even though in some cases the transmissions may entail somewhat higher first costs. There are, however, many considerations to be taken under advisement and it is very largely upon the success with which these requirements are appraised, correlated and assembled that the attainable reduction in power costs will become apparent.

Miami Valley Superintendents Entertained

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, October 27, 1930.—Members of the Miami Valley Division of the American Pulp and Paper Mill Superintendents, and officers of the national organization, were entertained the latter part of the past week by the Black-Clawson Company and the Shartle Brothers Machine Company, at the Butler County Country Club. An afternoon of golf, followed by dinner and entertainment in the evening, marked the first Fall meeting of the 1930-31 season, and the annual session of the Miami Valley Division.

Members of the executive committee of the national association arrived in Hamilton during the morning hours on Saturday, and were met by their hosts who supervised trips through the plant of the Black-Clawson Company, manufacturers of paper mill machinery, and the mills of the Champion Coated Paper Company. Luncheon was enjoyed at the Hamilton Club.

The executives attended the annual meeting in this city and transacted the usual business. The Dayton visit was made on Sunday. Marshall L. Barker, of the Beckett Paper Company, Hamilton, was elected president of the Miami Valley Division of the Paper Mill Superintendents at the annual business meeting which preceded the dinner. Herbert T. Ransdall, of the Champion Coated Paper Company, was the retiring president. He has served in that capacity in an efficient manner.

Other officers elected were: Royal H. G. Smith, of the Gardner-Harvey Company, Middletown, first vice-chairman; Tom Harvey, of the Gardner & Harvey Company, Middletown, second vice-chairman; Howard E. Teter, Mead Pulp and Paper Company, Dayton and Chillicothe, third vice-chairman; and Valentine Frederick, Jr., of the Beckett Paper Company, Hamilton, secretary and treasurer.

Plans were made for the next meeting of the Miami Valley Division to be held in Middletown on November 29. Similar meetings will be conducted each month, it was decided, during the coming year, by the valley superintendents who have found the gatherings to be greatly to their liking, profitable in technical and trade relations, and rich in social contacts.

One of the principal speakers at the evening meeting was Carl Magnus, president of the National Association of American Pulp and Paper Mill Superintendents. He expressed the appreciation of the officers of the group for the splendid entertainment.

Ephraim Stoddard Dead

APPLETON, Wis., October 15, 1930.—Ephraim Hiram Stoddard, 68, for several years a traveling salesman for the Appleton Woolen Mills, manufacturers of woolens and paper makers' felts, who for the last ten years resided with his daughter, Mrs. O. P. McKee, 299 East Second street, Fond du Lac, Wis., died at 7 a.m. today.

Born February 4, 1863, at Mishicot, Wis., he moved with his family to Appleton when he was 4 years old, residing there for many years. Mr. Stoddard came to this city ten years ago.

He was married July 2, 1881, to Lorena Knickerbocker, who died May 9, 1920. Mr. Stoddard was a member of the Baptist church, the Modern Woodmen and the U.C.T. Surviving are his daughter, Mrs. McKee, and a grandchild, Elaine Dennison.

Commerce Chamber Praises National Paper Products

[FROM OUR REGULAR CORRESPONDENT]

CARTHAGE, N. Y., October 18, 1930.—The National Paper Products Company has received the approval of the Chamber of Commerce for its efforts in beautifying the large tract of land adjacent to the West End mill. A vote of appreciation was extended this week by the directors of the organization to E. B. Eddy, general manager, who was largely instrumental for having the project completed. The appearance of the grounds surrounding the mill has been greatly improved.

Jones

A NAME THAT HAS WON A WORLD-WIDE REPUTATION THROUGH 75 YEARS DEVOTED TO PAPER-MAKING PROGRESS

A NEW SCREEN

LARGER CAPACITY . . CLEANER STOCK

Our New Leith Walk Inflow Screen

WE take pride in now offering our redesigned Leith Walk Inflow Screen in a larger size. Its sturdy construction, its elimination of floating and heavy dirt and the ease with which it may be cleaned are of interest to every paper maker.

Following are the most important of its many mechanical features: protected anti-friction bearings; discharges for convenient spouting to head box; adjustable stroke indicators; heavy and floating dirt discharges; counter balance springs (can be inspected while running); improved drum seal; enclosed drum drive and vibrator mechanism running in oil.

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NEW CONSTRUCTION AND IMPROVEMENTS

It has been another amazingly busy year for new construction in the pulp and paper industry in the United States and Canada. Vast sums of money also have been spent on the extensions and improvements to going mills.

This Annual Mill Number of the PAPPER TRADE JOURNAL is printed to visualize this activity. It has not been possible to include in the articles printed all of the new mills nor all of the outstanding improvements of the year, but the high lights in the work that has been going on have been presented in a manner, it is believed, that will furnish a good conception of the picture as a whole.

Since the last Mill Number a year ago at least a dozen great new pulp and paper mills have been completed and have begun production or will do so shortly. A considerably greater number have been expanded, improved and moderized. In practically all of these ventures the idea has been to produce mills of the highest type of efficiency, regardless within reason, of course, of the initial expense. This plan has been carried out in the industry for some years past until the pulp and paper mills as a whole on the North American continent probably cannot be equalled anywhere in the world in the matter of efficiency. This applies not only to the matter of pulp and paper making machinery, but to the auxiliary equipment and especially power generation. As is commonly known, pulp and paper mills are enormous consumers of power and unless careful watch is constantly exercised over this important factor, waste may easily occur that throughout the year may result in staggering losses. That pulp and paper manufacturers, especially in the past few years, have become more than ever impressed with this vital fact is evidenced by the numerous articles in this issue of the construction of new power plants and power plant improvements.

Among the outstanding new mills of the year is that of the Maine Seaboard Paper Company, at Bucksport, Me. This plant is rapidly being rushed to completion and will probably be in operation before the year ends. It is especially interesting from the fact that it is only one of four or five news print mills built in the United States since 1911 when the Taft Reciprocity Fiasco put news print on the free list, and, if memory serves correctly, the only news print mill built in New England since that time. The mill is equipped with two 228-inch fourdriniers and is designed to produce 600,000 pounds of news print daily. The plant is also equipped with thoroughly up to date sulphite pulp and ground wood mills.

The South has vastly increased its importance as a paper making center by the erection by the International Paper Company of Alabama, at Mobile of a three-machine kraft mill which began operation recently, and by the erection by the Southern Kraft Corporation at Panama City, Fla., of a two-machine kraft mill. Both of these concerns are subsidiaries of the International Paper Company and represent the last word in paper mill construction down to the smallest detail. The mill at Mobile is equipped with two 210-inch Fourdriniers and one 154-inch Yankee Fourdrinier and has a productive capacity of 350,000 pounds of kraft paper daily. It manufactures its own sulphate pulp.

The mill of the Southern Kraft Corporation at Panama City, Fla., which will go into operation early next year, is equipped with two 236-inch Fourdriniers, designed to produce 400,000 pounds of kraft paper daily. It also makes its own sulphate pulp.

In addition to these two large mills the productive capacity of the South was further increased this year by the additions to the already fine plant of the Brown Paper Mill Company at Monroe, La., of a 178-inch Fourdrinier, and a 178-inch cylinder machine, which is said to be the largest machine of this particular type ever made. This increased the capacity of the Brown plant to 150,000 tons of sulphate paper products annually and makes it, it is said, the largest kraft mill in the world. This mill was originally constructed only about a half a dozen years ago. Owing to modern equipment and its various natural advantages, it has already made a reputation as one of the most successful mills in the country. Its success financially has been specially gratifying to its owners.

Fewer mills than in the recent past were constructed in the Pacific Northwest the past year, but expansion continued on a scale that demonstrated that the pulp and paper industry has entrenched itself solidly in that section of the country and that it will continue to show substantial growth as years go along. The most important projects that have been put through in that section this year are the building of a sulphite pulp mill by the Puget Sound Pulp and Timber Company at Everett, Wash., and a sulphite pulp mill by the Olympic Forest Products Company, at Port Angeles, Wash. Both of these plants are models of excellence in their particular type. Both are five digester mills and they produce in the neighborhood of 350,000 pounds of sulphite pulp daily. The outstanding paper mill development on the coast during the year was probably the erection of the mill by the Fir-Tex Insulating Board Company, at St. Helens, Ore. The plant embodies an entirely new idea in the manufacture of insulating board, originated by Mr. C. A. Millington, vice-president and general manager of the Company, who is widely experienced in the manufacture of paper. This new mill is interesting among other

respects as showing the gradual diversification of the paper products made on the Pacific Coast.

Typical examples of improvements constantly being made by the pulp and paper mills throughout the country may be seen in the articles presented in this issue of the work that has been done during the year by the plants of the Oxford Paper Company at Rumford, Me., the P. H. Glatfelter Company, Spring Grove, Pa., the Rhinelander Paper Company, Rhinelander, Wis., the Chemical Paper Manufacturing Company at Holyoke, Mass. and various others.

Canada's most prominent contributions to the industry during the year include three great news print mills with sulphite pulp and ground wood equipment, and one great sulphite pulp mill. The news print mill of the New Brunswick International Paper Company at Dalhousie, N. B., went into operation in the spring. This mill has two 226-inch Fourdriniers and produces 500,000 pounds of news print, 160,000 pounds of sulphite pulp and 380,000 pounds of ground wood daily. The Mersey Paper Company, Ltd. at Brooklyn, N. S. has two 234-inch Fourdriniers and produces 500,000 pounds of news print daily, together with the necessary sulphite pulp and ground wood. The news print mill of the James MacLaren Company, which has just gone into operation, at Masson, Que., has two 234-inch Fourdriniers and produces 500,000 pounds of news print, and 160,000 pounds of sulphite pulp daily. The Restigouche Company, Ltd., which recently started at Campbellton, N. B., produces 300,000 pounds of sulphite pulp daily and is a subsidiary of the Fraser Companies, Ltd.

The outstanding improvement in Canada has taken place at the Powell River Company, at Powell River, B. C. The mammoth program of expansion and improvements undertaken by this company will total an aggregate expenditure of $13,000,000, and is now nearing completion with the big hydro-electric development on the Lois River. The expenditure of this princely sum on the improvements of a single large plant evidences better perhaps than anything else can the substantial character of the pulp and paper industry on the North American continent.

Japanese Paper Production Declines

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 29, 1930.—Production by mills of the Japanese Paper Manufacturers' Association during the first seven months of the current year totaled 400,225 short tons, a decrease of approximately 13,000 tons compared with the corresponding period of last year, while sales dropped from 400,693 tons to 388,879 tons during the same time. Consumption of paper base stocks by the mills during the seven months ended July 31, comprised 26,212 tons, of chemical pulp, 19,233 tons of mechanical pulp, 2,772 tons of paper waste, 726 tons of straw, and 875 tons of rags.

Valley Iron Works on a 9 Hour Schedule

A brief paragraph in the issue of the PAPER TRADE JOURNAL of October 16 stating that "After operating on a schedule of five hours a day for a number of weeks, the Valley Iron Works, Appleton, Wis., will resume its eight hour day custom," was inaccurate.

R. A. Peterson, treasurer of the company, writes this company's standard operating day is nine hours, not eight. The company has not been operating on a schedule of five hours a day for a number of weeks, as this schedule was put into effect on October 6.

Canadian Pulp and Paper Exports Increase

Pulp and paper exports from Canada in September were valued at $14,579,745, according to a report issued by the Canadian Pulp and Paper Association. This was an increase of $1,879,408 over the previous month's total and a decrease of $1,004,784 below the total for September, 1929.

Wood-pulp exports for the month were valued at $3,275,697 and exports of paper at $11,304,048 as against $2,539,680 and $10,160,657 in the month of August.

For the various grades of pulp and paper details are as follows:

	September, 1930		September, 1929	
PULP:	Tons	$	Tons	$
Mechanical	22,544	636,667	23,944	675,370
Sulphite Bld.	20,577	1,438,766	18,657	1,397,913
Sulphite Unbld.	13,980	687,713	16,369	794,207
Sulphate	6,578	422,047	9,476	538,965
Screenings	1,745	30,940	3,263	61,950
All Other	737	59,564	.....	.....
	66,161	3,275,697	71,709	3,468,405
PAPER:				
News print	194,820	10,909,298	201,249	11,689,638
Wrapping	1,170	129,160	919	103,450
Book (cwts.)	2,963	26,395	5,651	51,184
Writing (cwts.)	86	531	44	701
All Other	.....	238,664	.....	271,151
		11,304,048		12,116,124

For the first nine months of the year the exports of pulp and paper were valued at $133,696,935. In the corresponding months of 1929 the value was $145,618,067 so that there has been a decline this year of $11,921,132.

Wood-pulp exports for the nine months amounted to $30,127,354 and exports of paper to $103,569,581 as compared with $32,338,249 and $113,279,818 respectively in the corresponding months of 1929.

Details for the various grades are given below:

	Nine Months 1930		Nine Months 1929	
PULP:	Tons	$	Tons	$
Mechanical	146,752	4,247,969	152,382	4,200,488
Sulphite Bld.	191,101	13,993,036	192,438	14,581,008
Sulphite Unbld	146,354	7,286,538	143,221	7,070,560
Sulphate	67,949	3,988,124	101,729	5,998,522
All Other	21,573	611,687	17,700	487,671
	573,729	30,127,354	607,470	32,338,249
PAPER:				
News print	1,731,591	99,619,898	1,828,880	108,763,941
Wrapping	10,531	1,106,109	11,121	1,208,620
Book (cwts.)	29,535	277,496	55,975	478,351
Writing (cwts.)	2,101	17,957	3,850	35,010
All Other	.....	2,548,121	.....	2,793,896
		103,569,581		113,279,818

Pulpwood exports have been larger this year the shipments for the first nine months amounting to 1,107,159 cords valued at $11,221,892 as compared with 1,081,701 cords valued at $11,009,255 in the nine months of 1929.

Scandinavian Shipments Hold Up Well

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 29, 1930.—Official statistics for the first six months of this year show a decline in shipments from Norway and Sweden, with the exception of mechanical pulp, while Finland is able to show an increase in every grade with only a small drop in paper board according to a report from Commercial Attache M. H. Lund, at Oslo.

He states that pulp and paper shipments taken together seem to indicate that the paper industry has been more fortunate than many other industries, total exports for the three countries not having been much less than for the corresponding period of last year. It is possible, however, that the second half of the year will not show up so well, as shipments during the first six months were against old contracts, which had been placed to a very large extent before the full extent of the business depression was realized. Consequently the corresponding figures for the second half will be more reliable as an indicator of the effect of a general depression on the demand for paper and paper products. This is particularly true of the Scandinavian countries.

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Section of the
Technical Association of the Pulp and Paper Industry
Edited by Ronald G. Macdonald, Secretary

Explosion of Sulphite Pulp Digester At Berlin

By W. B. VanArsdel and P. L. Irwin[1]

Early in the evening of August 12, 1930, a ten-ton sulphite pulp digester in the Burgess Mill of the Brown Company, Berlin, N. H., was destroyed by an explosion which cost the lives of two men, and indirectly that of a third, and injured five more men. One end of the digester house was demolished and that part of the acid-making apparatus which was located alongside was wrecked. The effects of the explosion were confined to a circle of radius about seventy-five feet. There was no loud report; many nearby residents were unaware that there had been an accident. The two sulphite pulp mills owned by the Brown Company were immediately shut down, pending a complete investigation of the disaster, and sufficient data have now been accumulated to warrant the publication of this preliminary report, which is concurred in by H. O. Keay, of the Canada Power and Paper Corporation, and O. W. Ellis, of the Ontario Research Foundation, and by Dan L. Royer, chief engineer of the Ocean Accident and Guarantee Corporation, who have been active in the investigation.

Description of Digester

Tht digester which failed, known in the mill as No. 16, was built in 1905-6 and erected in April, 1906. It was designed with two central cylindrical courses, each 15 feet in inside diameter, by 10 feet, 3 inches, long, and sharply tapering end courses, the top one 15 feet 5¾ inches long, and the bottom one 13 feet long. The over-all length was therefore just short of 49 feet. The general design is indicated in Fig. 1. The shell was 1-inch boiler plate of the quality known as flange-steel. The cylindrical courses were constructed in three segments, butt-riveted together with a single cover-plate of 1⅛-inch thickness; rivet-heads inside the digester were counter-sunk into the shell-plates. This design was considered to be good practice at the time the digester was built, because it provided a smooth inside surface on which to build the lining. The shell was lined with masonry in the accepted manner, which includes a semi-pasty silicate grout next to the shell and then two courses of acid-proof brick.

No substantial alterations or additions had been made to the steel since its installation, and there had been no evidence of dangerous weakness at any time. The brick lining, of course, had been repaired or replaced from time to time as a routine matter; the inside brick facing had been thus replaced in July, 1929. The original silicate backing had never been removed from the shell. This digester, along with the others, had passed the usual insurance inspection about a month before the explosion.

The arrangement of the digester house is such that No. 16 was third from the end in a single row of digesters. There were no large doors or windows nearby which could admit a draft of cool air and thereby chill the shell.

August 12 was a Tuesday. The digester had been blown last at 3:10 Sunday morning, the 10th, and then shut down until 9:45 on the morning of the 12th, when it was again steamed up. During the 54½ hours intervening a current of live steam was left running through the empty digester to keep it warm, that being standard practice in this mill.

The temperature and pressure records were recovered from the recording instruments after the explosion, and although they were damaged, it was possible to follow the course of events on them. The vessel reached its normal cooking pressure of 70 lbs. per sq. in., gauge, 1 hour, 50 minutes after steaming, which would be considered a normal length of time for steaming up. This is indirectly confirmatory evidence that the digester was warm at the start, since a cold digester is slower in coming to pressure. The pressure remained at 70 lbs. and the temperature rose normally as cooking progressed. Seven hours, 37 minutes, after steaming, a longitudinal butt-strap in the lower cylindrical course failed without any warning. The rupture followed roughly the center-line of the strap, jumping back and forth several times between the two

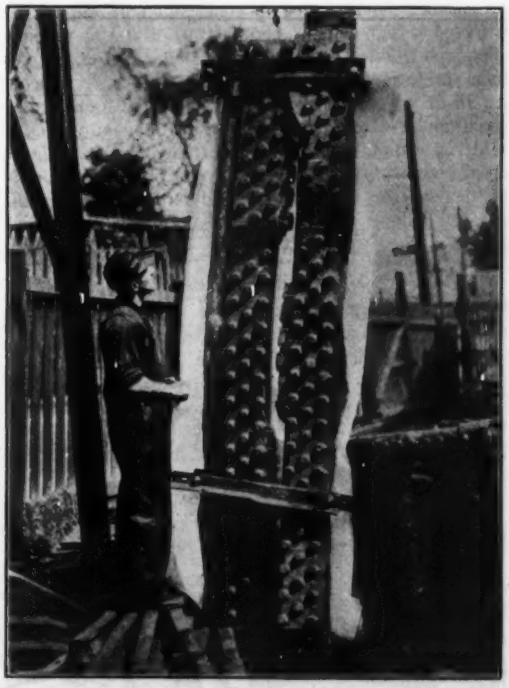


FIG. 2

[1] Brown Co., Berlin, N. H.

central lines of rivets; at the end of the course the rupture continued as a tear in the circumferential straps, thus allowing a huge flap of the shell to open out and the contents of the digester to discharge. The tear continued about half-way around the vessel. The escaping charge blew a great hole in one of the brick walls of the building, and the reaction knocked the digester over and through the opposite wall, the base remaining almost stationary. Scalds from live steam, burns from the acid and injuries from falling timbers and bricks accounted for the casualties.

Examination of Ruptured Strap

The two halves of the ruptured longitudinal strap were cut out of the wrecked shell, carefully examined and then roughly reassembled, as shown in Fig. 2. Action of hot sulphurous acid on the freshly broken surfaces had produced sufficient discoloration so that it was no longer possible to distinguish between old fractures and the new one, but study of the course of the break made it seem entirely possible that incipient cracks radiated from several of the rivet-holes. There was no evidence at any point of plastic deformation of the metal, such as would occur in a statically overstressed ductile material. As nearly as could be determined from the appearance of the fracture, the failure was not due simply to fatigue. No signs whatever of acid corrosion were detected.

Theories as to Cause of Failure

An almost exactly similar digester explosion, which occurred at the plant of the Laurentide Company, Ltd., at Grand Mere, P.Q., has been described by H. O. Keay.[1]

The same author[2] made a careful study of the stresses in the single butt-strap which failed in that instance, as in the present one, and concluded that the unsymmetrical design causes the development of high bending stresses near the center-line of the strap and somewhat less severe bending stresses in the shell-plates near the edges of the strap. He showed that the total stress which might be developed in extreme fibers was well in excess of the elastic limit of the steel in that particular strap, which happened to be abnormally low. Keay believed that repeated stressing beyond the elastic limit of the material eventually caused its rupture by gradual opening up of cracks starting from the punched rivet-holes.

Many other investigators have studied the failure of mild steel boiler metal.[3] Failures due to composition of the material have been traced to high sulphur, phosphorous or arsenic or the presence of pipes, blow-holes or inclusions. Defects of construction may include careless riveting, sharply bent flanges or punched rivet-holes, all of which are likely to set up severe local stresses. The material under stress may become brittle upon aging.[4] Conditions of operation, such as the opportunity for corrosion of overstressed sections, particularly that type of attack known as caustic embrittlement; or such as may lead to hydrogen occlusion, may also cause failure. Each of these conditions has typical effects upon the ultimate strength, ductility, hardness or micro-structure.

Description of Tests Made

The Brown Company was confronted by the fact that there were a number of other digesters in service in Berlin of the same general design, construction and age as No. 16; three of them, in fact, were 34 years old, as against 24 years. The question of the cause of the failure of No. 16 was therefore immediately extended to include an examination of the probable safety of all the others.

One of the other butt-straps was removed from the shell of

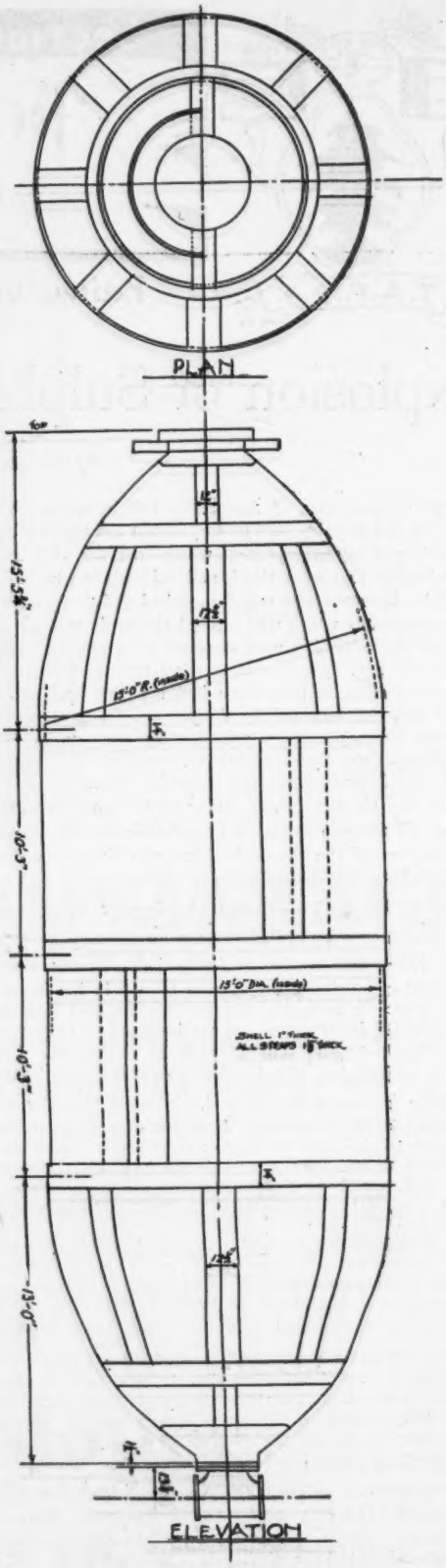


FIG. 1

[1] "The Digester Explosion at Grand Mére, P. Q.," Paper, *13*, No. 16, pp. 15-19, (1914).
"An Investigation of the Explosion of a Sulphite Digester in the Paper Mills at Grand Mére, Quebec," J. Ind. and Eng. Chem., *6*, pp. 26-32, (1914).

[2] "An Investigation of Stresses in Digester Shells," Paper *21*, No. 4, pp. 14-26, (Oct. 3, 1917).

[3] See for instance, "Fractures in Boiler Metal," White and Schneidewind, Preprint No. 28, Trans. A.S.M.E., June 9, 1930 meeting.

[4] "The Aging of Mild Steel," C. E. Stromeyer, Jl. Iron and Steel Inst., *73*, 200-221 (1907); *75*, 86-104 (1908); *79*, 404-420 (1909).
"Change in Tensile Strength Due to Aging of Cold-Drawn Iron and Steel," L. B. Pfeil, Jl. Iron and Steel Inst., *118*, 167-181 (1928).

No. 16, and a transverse section 8 inches wide and 18 inches long (the full width of the strap) was cut from it; the strip thus included two rivet-pitches. It was supported near the ends under a steam hammer, and was bent by blows from the hammer, transmitted to the center of the specimen by a two-inch round bar. Instead of bending, however, the specimen fractured sharply after two moderate blows from the hammer. Firebox steel of this thickness, according to the A.S.T.M. specification A-70-27, should stand being bent cold through an angle of 180°, around a mandrel of two-inch diameter. A strap was thereupon cut from No. 13 digester, and an 8x18 section taken from it was found also to be brittle when an attempt was made to bend it. Since it was manifestly impracticable to test all of the butt-straps in this manner, smaller-scale tests were made as follows: A rectangular block about three inches wide and seven inches long was drilled out between rivets, across the center-line of the strap, and in most cases near the center of its length, since Keay's deflection-micrometer experiments on butt-straps of similar digesters during actual cooking operations indicated that the maximum bending stresses should be found there. Blocks of this kind were cut from each strap of all the single-strap digesters in the two mills (except two, which were temporarily isolated by the accident). Each block was cut into three strips longitudinally—two flat pieces about ⅜ inch by 1½ inch, used for bending test, and a piece about 1 inch square, used for tensile and other tests. One of the flat pieces was bent slowly on a testing machine, deflection vs. load readings being taken in a number of cases, and the other piece was bent by blows from a steam hammer. The results were extremely variable. Most of the samples could be bent flat on themselves, and even hammered, without any sign of fracture; but others broke sharply at comparatively small angles of bending. In general, the two methods of making the bending test checked one another well. Two test-blocks were cut from the most brittle strap found; the fractures produced were almost identical, and occurred at nearly the same angle of bending. Another strap from the same digester yielded metal which was perfectly ductile. All but one of the samples taken from the 34-year-old digesters were found to be ductile.

Standard tensile tests-pieces were machined from the inch-square bars, and a number of tensile and hardness tests and chemical and microscopic examinations were made in the laboratory of the Ontario Research Foundation. As might have been expected, the ones which were markedly brittle in the bending test had high ultimate strengths and low elongations; but in addition, the most brittle one had the very low elastic limit of only 10,000 lbs. per sq. in., as against an ultimate strength of 72,800 lbs. per sq. in.** On the other hand, a number of the ductile test-pieces had ultimate strengths lower than the minimum set by specification A-70-27, namely 55,000 lbs. per sq. in. The lowest value noted was 47,200 lbs. per sq. in. In some cases the yield-point was also less than half the ultimate strength—a third requirement of the specification. Chemical analysis of one of the most brittle straps had the following result:

Carbon	0.32%
Silicon	0.012
Manganese	0.49
Sulphur	0.079
Phosphorus	0.017

Here again the material failed to measure up to present-day requirements, as expressed by the A.S.T.M. specification; carbon and sulphur contents are above the maximum allowable for firebox steel. Microscopic examinations showed marked segregation of the carbon in several cases, particularly in the brittle strap whose chemical analysis is quoted above.

Conclusions

Determination of the immediate cause of the failure of No. 16 digester will not be possible until further information is available from the metallurgical tests, which are still under way. Sufficient evidence has already been collected, however, to prove beyond any doubt that some of the steel used in building this type of digester was faulty; whether it has been embrittled in service has not yet been established, but in all probability, such is the case. In addition, the single butt-strap riveted construction is now recognized to be poor design. In view of these facts, the Brown Company is removing all of the digesters of this type from its plants.

** The endurance limit of such an unusual mild steel is difficult to estimate.

Forced Vapor Circulation In Paper Driers

Paper and pulp drying machines in which the drying section consists of one or more cylindrical driers secure their drying effect by the transfer of heat given off by the steam within through the shell of the drier to the sheet of paper as it comes in contact with the surface of the drier. It is evident that the fewer hindrances there are to the transfer of heat through the shell of the drier the more effective and efficient the drying operation will become. Consequently, it is necessary to keep the sheet in the drier section a shorter length of time to secure the removal of the proper amount of moisture so that, as the drying rate increases, the speed of the machine can also be increased and therefore a greater production secured.

Factors Affecting Heat Transfer

As the steam inside the drier gives off its heat and, as this heat moves toward the outside of the drier shell, it can be seen that the rate at which this heat transfer will take place will be effected by the following factors:

1. The thickness of the drier shell and the kind of metal.
2. The proportion of the drier with which the paper comes in contact.
3. The amount of water in the drier and the film of water adhering to the inner surface at the higher speed.
4. The air or non-condensible gases from the steam which is contained in the drier.
5. The rate of the removal of condensate and air effected by the rapid circulation of steam through the dryer.

The first two items are governed by the design and construction of the drier section and the driers. Therefore, it is not necessary to discuss them, but these items are of sufficient importance that they have been given thoughtful consideration by paper machine designers.

As the steam in the drier condenses, it gives off a certain amount of heat which is known as the latent heat of vaporization which amounts to approximately 970 B.t.u. per pound of steam condensed. Water, on the other hand, does not contain this latent heat of vaporization and in addition is a very poor conductor of heat, so that if the water of condensate is allowed to remain in the drier, it retards very much the transfer of heat from the steam through the drier shell. If the capacity of the water to transmit heat is compared with the capacity of the iron in the drier shell, it is found that the water is about 85 times as good an insulator as the iron in the drier shell.

Proper Drainage of Each Drier

Air is also a first class insulator of heat and, if the insulating capacity of the air is compared with the insulating capacity of the drier shell, it is found it has about 2000 times the insulating capacity of the drier shell. Therefore, unless the air and water are constantly and completely removed from the driers, some of the available heat in the steam will be used in overcoming the insulating effect of the water and air. The result will be a greater steam consumption per pound of paper dried, a loss in production and a varying and inferior quality of paper.

Unless the proper drainage of each drier has been provided for,

the operation of the driers will tend to be intermittent; that is, they will alternately become partly filled with water tending to cool down the surface of the driers, then when the water of condensate is suddenly discharged the driers will heat up. The result of this uneven operation is detrimental. As the sheet goes from a cool drier to a hot drier the sudden change in temperature results in strains which appear in the form of cockles or often in breaks in the drier section, and it is practically impossible to produce a satisfactory sheet of paper efficiently unless all the driers on the paper machine are working properly which means that the condensate and air is constantly and completely removed from each drier.

Elimination of Air and Water

Steam is most effective when in active circulation and, if maximum efficiency and drying capacity are to be secured from the paper machine, the water and air must be eliminated from every drier so that the entire heating surface area of the cylinder will be exposed to the action of the steam. This elimination of air and water from paper machine driers is and always has been a constant problem which paper mills have had to face and the problem has been very much complicated by the fact that the conditions inside the drier could not be seen.

Every paper mill man knows that, if the main return header from the driers be opened allowing the steam to blow through the driers and directly out to the atmosphere without any valve, stop cocks, traps or other restrictions of any nature in the pipe lines, the drying capacity of the paper machine would be very much increased. The reason for this increased capacity is the increase in the temperature in the drier which is due to the complete elimination of the condensate and air from the cylinders by the high velocity of the steam through them, caused by the difference in pressure between the inside of the dryer and the atmospheric pressure. As a result of this, the cylinder face is at maximum steam temperature, but the problem of drier drainage is complicated by the fact that the steam must be used economically. To blow the steam and condensate into the atmosphere, of course, would be extremely wasteful and cannot be permitted in these days of high fuel cost, because the increase in production would be more than offset by the extravagant use of steam.

There is a forced vapor system of drainage which will keep every drier absolutely free from water of condensate and air and at the same time utilize the steam in the driers efficiently and economically and produce a gradually and evenly dried sheet of paper.

Ideal Conditions in the Driers

In the Fulton Forced Vapor Circulating system (Fig. 1) the same effect is produced on the driers as far as the temperature is concerned, as blowing steam through the cylinders and into the atmosphere and, in addition, all of the available heat in the steam supplied to the paper machine is utilized. The rapid and continuous circulation of steam through each of the cylinders constantly removes all the water and air from each drier, thus maintaining ideal conditions in the driers; therefore, the pressure is steady, and the cylinders do not operate intermittently, but at a uniform temperature and at maximum efficiency and capacity, which means even drying. The constant and complete removal of the condensate and air from the cylinders by active circulation of steam makes an effective heating surface over the whole cylinder face and throughout the entire machine, thus ensuring the following:

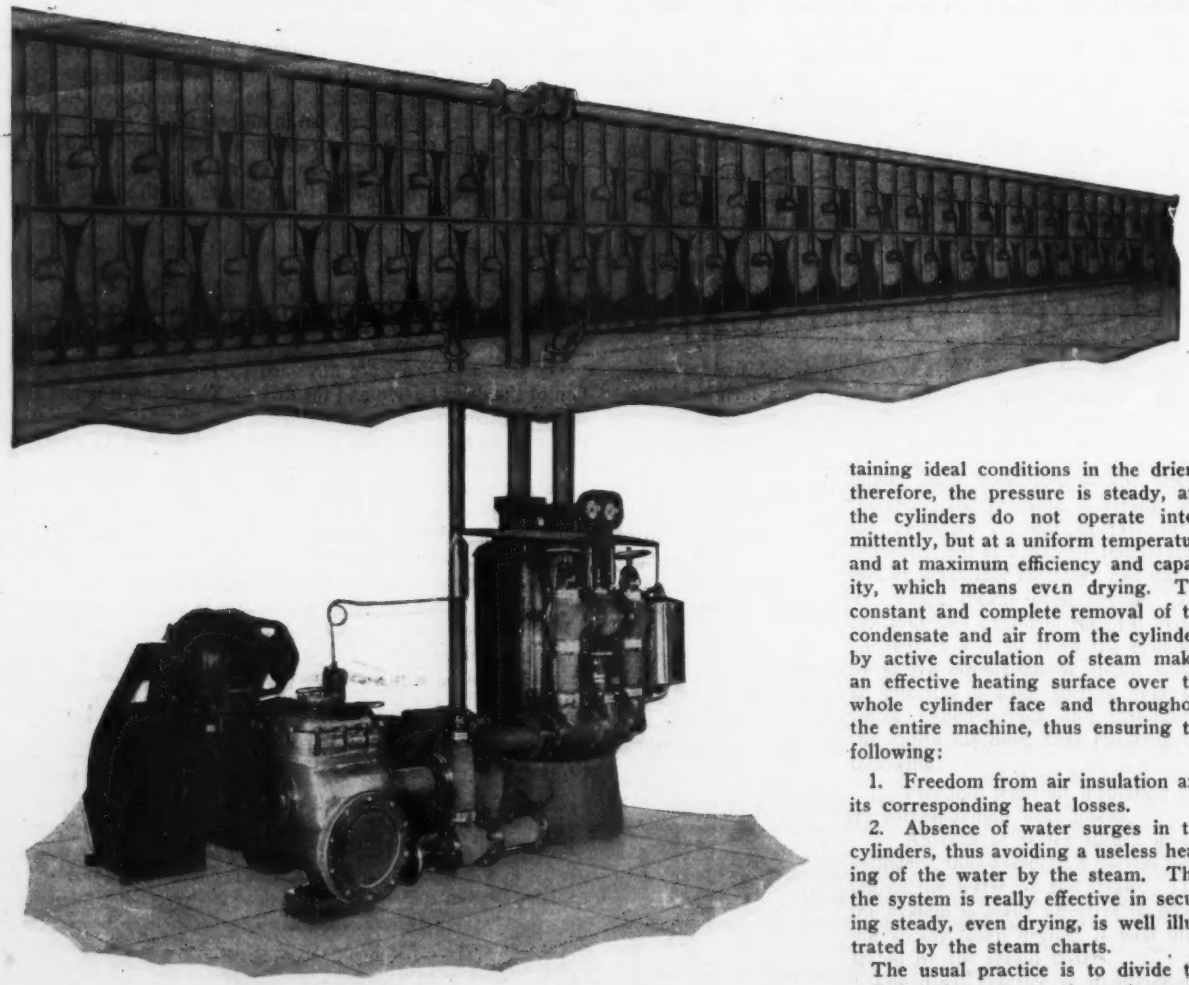


FIG. 1

1. Freedom from air insulation and its corresponding heat losses.
2. Absence of water surges in the cylinders, thus avoiding a useless heating of the water by the steam. That the system is really effective in securing steady, even drying, is well illustrated by the steam charts.

The usual practice is to divide the cylinders into two sections, the steam

supply being admitted to the dry end section of the driers, blowing unrestricted through the cylinders, into the common return header which is connected to the steam separator. The condensate from the dry end is deposited in the steam separator and the remaining steam and air pass onto the cylinders on the wet end section of the paper machine.

The Wet End Section

The wet end section consists of approximately 25 per cent of the dryers and might be termed the condenser section, for the sheet coming from the presses is cold and wet and rapidly condenses the steam in the cylinders. This condensing effect is a natural phenomenon of which advantage is taken to produce a drop in pressure between the steam supply to the dry end cylinders and the return header, thus causing a rapid circulation of steam at high velocity through the dry end section. By the means of the high velocity of the steam passing through the cylinders and into the return header, the condensate is constantly carried out in suspension with the steam and cannot form into slugs and overload the return pipes. At the same time the air is also effectively removed by this velocity.

There must be some good means of removing water and air from the cylinders at the wet end, or these cylinders will become air bound, partly filled with water, and operate intermittently, which would be far more detrimental to the sheet, than if it occurred at the dry end; if the wet sheet strikes a hot drier, cockling, shrinking and blistering may result.

Uniform and Efficient Operation at Wet End

The uniform and efficient operation of the cylinders at the wet end section is accomplished with a vacuum pump which creates a lesser pressure or vacuum in the return pipe from each wet end drier. Each cylinder on the wet end is equipped with a steam trap which is provided with an air by-pass. The air by-passes from each trap is piped into a small auxiliary header which supplies steam to the first or lead cylinder on the extreme wet end of the paper machine. In this manner the small amount of steam which may escape with the air through the air by-passes is condensed in the leading or first drier, and as the drop pipe from this cylinder is piped directly to the main vacuum return header on the wet end section, the air is effectively removed and no steam is wasted.

The vacuum return line from the wet end cylinders is connected directly to the suction of a vacuum pump which also removes the condensate from the steam separator through a regulating device actuated by an outside float control.

Indestructible Outside Float Control

Particular attention is called to this indestructible outside float control which is a noteworthy and distinct feature. The float tank is connected to the steam separator at top and bottom with flexible bronze hose. As the water rises in the steam separator, it flows into the tank; maintaining the same level as in the steam separator and the additional weight of water overcomes the resistance of the balancing weight on the opposite end of the lever, allowing the float tank to drop slightly, which opens the regulating valve and permits the water of condensate to pass from the separator to the pump. The advantages of this outside float control over thermal controls or a hollow float resting on the surface of the water inside the steam separator and subject to the action of the pressure and steam are evident.

Improved Double Bar Type

The balancing lever supporting the float tank and weight is of the improved double bar type, being formed of two steel bars seccurely riveted together in the shape of a truss to give it the greatest stiffness and strength possible without excessive weight. Mounted on ball bearings, it has the delicate balancing action of a scale beam which confines the water level in the steam separator to pre-determined close limits. The lever, weight, float tank and trimmings are heavily nickeled.

Where a steam vacuum pump is used, the exhaust is piped into the steam separator and aids in drying the paper. However, motor driven vacuum pumps of either the centrifugal or the reciprocating type may be used with equally satisfactory results.

Included in the equipment is a mercury column differential gauge. The top connection to this gauge is piped to the wet end section of the main steam supply header on the paper machine and the bottom connection is piped to the steam header on the dry end section of the paper machine. Hence, the gauge indicates the exact difference in pressure between the two sections of the header. The weight of a given column of mercury not being effected by springs or other variable mechanisms, the mercury column gauge will indicate at all times the true pressure differential between the wet end and dry end sections of the driers, constituting a reliable check on the operation of the system and ensuring constant maximum drying capacity from the paper machine.

Flexibility and Simplicity

On many paper machines, it is necessary to produce many different grades and weights of paper which necessitate a wide range of machine speeds and steam pressures in the cylinders. It is under conditions such as these that the flexibility of the system is best observed. Variations in pressure and speed do not disturb its efficient and economical operation, and the changes are taken care of without any attention or adjustments by the operators as the system is entirely automatic. Working parts have been reduced to a minimum and the maintenance of the entire system consists of only the upkeep of a high class vacuum pump of liberal proportions. No water seals, thermostats, check valves or large traps are used in this drainage system.

New TAPPI Members

O. M. Cornell, sales engineer, Kalbfleisch Corporation, Erie, Pa.

Raoul de St. Hilaire, technical director, Procedes Navarre, Lyon, France.

G. J. Esselen, consulting engineer, Boston, Mass.

Herman Gevers, superintendent, Longview Fibre Company, Longview, Wash.

L. G. Green, chief engineer, A. P. W. Paper Company, Albany, N. Y.

K. B. Hall, sales engineer for Noble & Wood and Filtration Engineers, Portland, Ore.

C. G. Malcolm, industrial fellow, Mellon Institute of Industrial Research, Pittsburgh, Pa.

J. C. Monty, manufacturing department, International Paper Company, New York, N. Y.

H. E. Obermanns, student, Institute of Paper Chemistry, Appleton, Wis.

W. H. Toppan, general superintendent, Cushnoc Paper Corporation, Augusta, Me.

To Build New Generating Station at Holyoke

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, October 28, 1930—The annual meeting of the Holyoke Water Power Company was held last week followed by the meeting of the Holyoke Light and Power Company a subsidiary concern which elected the same officers. Formal announcement was made of the probability of having a new generating station either at the Hadley mills plant recently bought or near the Norman Paper mill. An additional large generating unit is to be installed at the power plant station on the river bank. These officers were elected: President and Treasurer, Robert E. Barrett; Vice-President, Joseph A. Skinner; Assistant Treasurer and Clerk, Ralph A. Smith; Directors, Edward Milligan, Walter L. Goodwin and Charles A. Goodwin of Hartford, Conn., George Dwight Pratt, George C. Bulkley and Frederick M. Jones of Springfield, Robert E. Barrett, Joseph A. Skinner and Dr. Frank A. Woods of Holyoke.

Current Paper Trade Literature

Abstracts of Articles and Notes of Papermaking Inventions Compiled by the Committee on Abstracts and Bibliography of the Technical Association of the Pulp and Paper Industry

Clarence J. West, Chairman

For photostatic copies of articles appearing in the Abstract Section, address the chairman of the Abstracts Committee, Dr. Clarence J. West, National Research Council, 21st and B Streets, Washington, D. C. The charge for this service is 25 cents per page. Copies of United States patents may be obtained from the U. S. Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Arrangement for the Side Guidance of a Web of Paper. William Marx Frankfurt a.M. Germany. German pat. 492,540 (Oct. 18, 1928).—The sheet runs between a cell, sensitive to light, enclosed in a housing with an opening and a lamp which projects a beam of light to the opening. The deviation of the sheet from its true course influences the cell sensitive to the light, because more or less light strikes the cell.—J.F.O.

Automatic Removing Device on a Paper Machine. Linke-Hofmann-Lauchhammer A. G. Abtlg. Fullnerwerk, Warmbrunn, Schlesien, Germany. Swedish pat. 68, 215 (April 6, 1926).—A special roll is pressed against the top couch roll around which an automatic removable felt runs. This felt gives up the paper sheet to the smoothing cylinder, which contrary to the usual working method, lies on the inverted side of the wire, that is the top side.—J.F.O.

Arrangement for Feeding Sheets to the Folding Machine. G. Spiess, Leipzig, Germany. Swedish pat. 68,094 (Dec. 13, 1927).—The rolls of the conveyor table placed obliquely to the direction of the sheets, push them to one side against a movable regulator in the direction of the sheets, on which the introduced sheets lie close to the edge whereby the crooked running of the sheets in the machine is avoided.—J.F.O.

Automatic Regulator for Flowing Liquids or Stock, Especially Paper Stock. Erik Sall, Sorfly, Kilafors, Sweden. Finnish pat. 12,543. (Feb. 12, 1927).—The flowing stock is led past an obstruction built in the stock channel. On the one side, a movable float is used whose motion is dependent on the concentration or change in quantity, "difference in level," of stock and is combined with a charging or discharging device which is influenced by the stock, which charges or discharges the movable device, depending on the change in level or specific gravity of the stock. This impulse is carried over to the regulating device which regulates the addition of the water, that is, the water discharge, the passage of the stock through the screen, etc.—J.F.O.

Paper-Web-Feeding Machine. Samuel J. Campbell assignor to Hudson-Sharp Machine Co., U. S. pat. 1,747,857, (Feb. 18, 1930).—The machine provided for in the invention is designed primarily for the purpose of feeding a continuous web of paper through embossing rolls and then cutting the embossed sections to form napkins. Two webs are fed simultaneously to the embossing rolls and are then separated to feed them to the cutting rolls. In order to ensure proper registering, so that the paper is cut between the embossed design, regulating bars are provided between the embossing rolls and cutters, so as to adjust the length of the paths of the two webs independently and obtain synchronism between the embossing device on the one hand, and the two cutters on the others.—A.P.-C.

Paper Cutter. Clarence O. Thorne. U. S. Pats. 1,752,124 to 1,752,126. (March 25, 1930).—No. 1,752,124—The invention provides a gauge bar resting on the cutting table at right angles to the knife, for jogging and squaring the pile of paper to be cut. The bar is operated through eccentrics which are located near each end of the bar and which are mounted on a shaft which can be rotated by admitting compressed air into a cylinder, the piston of which is connected by a pitman to a bell-crank lever keyed to the shaft. No. 1,752,125—The gauge bar is operated by a so-called "actuating rod," parallel to the bar and provided near the ends with oppositely disposed cam portions which act to push the bar against the pile of paper to be cut thus jogging and squaring it. The rod itself is operated by means of a compressed air cylinder at each end. No. 1,752,126—The principle is the same as that of the last two patents but provides a somewhat different construction of the means for operating the gauging bar.—A.P.-C.

Wire Cloth for Paper Making. W. Beebe. Wire 4, 297, 317-318 (1929).—The manufacture of endless wire mat for papermaking machines is described. The relative merits of brass and bronze are discussed.—C.J.W.

Grinding Machine for Rolls and Cylinders. Der Pap. Fab No. 1 Page 5 (Jan. 5, 1930).—Description of the construction and operation of the grinding machine manufactured by Firma C. G. Haubold, A.G.—J.F.O.

Method of and Apparatus for Detaching Sheets of Paper of Uniform Length. Xaver Dambacher assignor to Windmoller & Holscher G.m.b.H. U. S. pat. 1,745,358 (Feb. 4, 1930).—A suitable number of paper webs are fed to perforating or similar devices, which perforate or weaken the webs transversely at the lines along which the webs are to be severed. The webs are then brought together and superimposed so that the weakened lines are superimposed stepwise. The webs are passed together through a pair of feeding rolls and from these pass through a pair of tearing rolls which are driven at a much higher speed than the first pair.—A.P.-C.

Safety Device for Paper Cutters. Andrew T. Moyer. U. S. pat. 1,749,296, (March 4, 1930).—The patent provides a simple device which can readily be attached to existing cutter and which provides a buffer bar which by means of a simple and cheap arrangement of levers, is thrust outward by the down stroke of the knife thereby forcing the hands of the operator out of the danger zone while the knife is descending.—A.P.-C.

Sand Paper Cutting Machine. August W. Warsen. U. S. pat. 1,744,818. (Jan. 28, 1930.)—The machine is particularly adapted for cutting sand paper. The knife is nearly, but not quite horizontal, so that when it is lowered, it gives a shearing action. The knife is mounted on a frame that is reciprocated vertically; it is also pivoted so that immediately after the cut is completed, a trip releases it and it swings out of the way of the web of paper being fed to the cutter.—A.P.-C.

Roll With A Relief Pattern for the Color Pattern of a Web of Paper. Friedrich Obitz, Rastatt, Baden, Germany. German pat. 495,056 Kl. 55f Gr. 3 (May 30, 1928).—The relief pattern is composed of a water repelling material, such as spirit shellac by solvents.—J.F.O.

Shrinkage. Aubrey T. Taylor, Bedford Pulp & Paper Co. Paper Trade J. 89, No. 14, 84-85 (Oct. 3, 1929).—A brief outline of the shrinkage loss at the mill of the Bedford Pulp and Paper Co., Big Island, Va., and of the manner in which it was reduced by installation of save-alls and reduction of the amount of fresh water used on the paper machine showers. Measurement of the mill effluent and its fiber content accounted for all but about 3 per cent of the shrinkage—A.P.-C.

Vapor Transmission Through Papers*

By Allen Abrams[1] and Warren A. Chilson[2]

Summary

Vapor transmission through papers is largely dependent on the vapor pressure differential on the two sides of the sheet. Water vapor transmission is therefore largely affected by temperature and humidity, although other factors investigated have a minor influence on this rate. A suggested tentative method is to expose the paper to vapor at a fixed temperature and with a definite vapor pressure differential, the loss in weight over a certain period being computed to grams per 100 square inch per 24 hours. Homogeneous papers have vapor transmission rates generally proportional to their water penetration qualities but this relation does not hold for heterogeneous papers. The rate of passage of air through papers appears to bear no direct relation to the passage of water vapor through the same sheets.

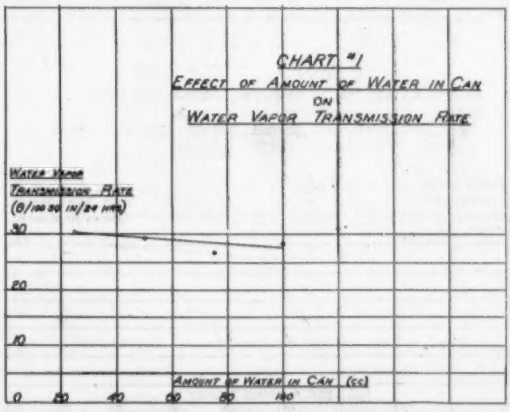
Introduction

In recent years recognition of the fact that moisture content is very important in maintaining the proper condition of certain foods has brought about radical changes in the packaging of such stuffs as bread, cake, crackers, cigars, cigarettes and other forms of tobacco.

Important as this subject is, there appears to be relatively little reference to it in the literature. Carson[3] discusses the difference between waterproofness and moistureproofness, indicating that it may be that the two are different. Our later work proves this to be correct for heterogeneous papers, but that there is some relation for homogeneous sheets.

Carson also mentions a method for testing the resistance of paper to moisture but concludes that it is too tedious to find general favor as a routine test.

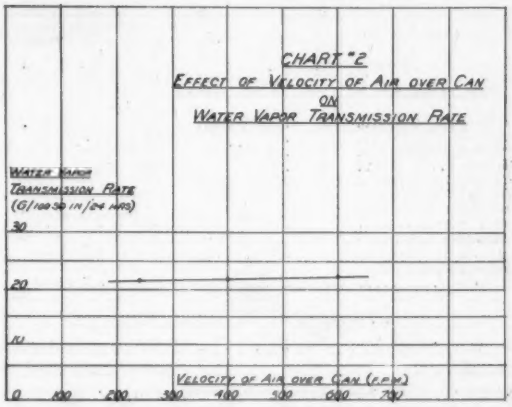
Harvey[4] describes a method of testing board for moistureproofness, wherein the sheet is fastened to a metal frame having a damp felt inside. The sample is then placed in a tight chamber at a definite temperature and with a drying agent outside the frame. After the assembly has been seasoned for one hour it is weighed, exposed



for 2½ to 5 hours in the chamber and the moisture loss is then calculated to grams per sq. in. per 24 hours.

Hyden[5] describes a method for testing moistureproof cellophane whereby the material is sealed over a glass dish containing water and the weight loss is determined when the dish is placed in an oven at 100 deg. F. The air is circulated by a fan and dried by concentrated sulphuric acid kept in flat trays. The results are reported as water loss in mg. per sq. m. per hour. Hyden states that the higher temperature allows a more rapid diffusion than at lower temperatures. Our work indicates that the rate of diffusion is governed by the differential pressure of water vapor against the test sample; but there is an objection to testing at 100° F since the moistureproofing on some papers may soften at this temperature and give results which are not representative of the value of the paper at the lower temperatures where it is to be used.

Edwards and Pickering[6] present some interesting data on the permeability of rubber to gasses. Their work was done with a high



degree of accuracy and with considerably more complicated equipment than could be used in the ordinary testing laboratory. However, in testing the permeability to water vapor they found that this type of equipment gave erratic results and they therefore resorted to the simpler method of exposing the sheet to water-saturated air on the one side and dry air on the other. Their investigations showed that the permeability of rubber to any gas is directly proportional to its partial pressure, provided the total pressure is constant; and that the permeability of rubber to water vapor is very high as compared with such gases as hydrogen, oxygen and nitrogen.

General Procedure

For some years we have used and investigated a method for simple and reliable determination of the resistance of papers to the penetration of water vapor. In view of the fact that most up-to-date mills are equipping themselves with rooms controlled both for temperature and humidity, our method has been evolved with the idea of its applicability to such testing rooms.

Briefly, this method consists of exposing the sheet to water vapor for a definite time, having saturated air on one side of the sheet and a definite, lower humidity on the other side. In the work here to be described we have used a controlled room in which was placed the necessary equipment, such as desiccators, recording thermometer, indicating hygrometer, electric fans, anemometer; and proper arrangements for the exposure of wrapped products such as bread, cake, crackers and tobacco.

For the purpose of holding the sheet conveniently while exposed to water vapor, we have developed a light can having a separable, flanged ring, whereby the sheet can be fastened firmly to the body of the can by means of knurled brass screws. This exposes 7.07 sq. in. of surface to the water vapor. In each of the experiments here described two check cans were used for each test. By weighing the can before and after exposure, the results can be calculated

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* Presented at the fall meeting of TAPPI, Erie, Pa., Sept. 3-5, 1930.

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[2] Member TAPPI, chemical engineer, Marathon Paper Mills Company, Rothchild, Wis.

[3] P. T. J. 79, 10, 48-50 (Sept. 4, 1924).

[4] P. T. J. 78, 26, 50-52 (June 26, 1924).

[5] I. & E. C. 21, 5, 407 (May, 1929).

[6] Chem. & Met. Eng. 23, 1, 17-21 and 23, 2, 71-75 (1920).

over to an arbitrary basis of water vapor transmission rate in grams per 100 sq. in. per 24 hours.

While a wide range of papers has been tested, we found it desirable to select one fairly uniform sheet on which to carry out our investigations of factors affecting the method. We therefore chose a sheet which has a relatively high transmission rate and yet which is fairly resistant to liquid water. This was a non-moisture-proof cellulose acetate sheeting supplied by H. A. Levey. Two weights were used, since one roll was exhausted before the tests were complete. The characteristics of these sheets, together with the others tested, are shown in Table 1.

TABLE 1
PAPERS USED FOR TESTING

No.	Kind of Sheet	Weight (24x36-480)	Caliper	Density Wt./Caliper	Porosity sec. for 100 cc	cc per min.	Water penetration by Dry Indicator (sec.)	Water Vapor Transmission Rate (g/100 sq. in./24 hrs.)
1	Cellulose Acetate....	13	.0007	19	4700	1.3	82	20
2	Cellulose Acetate....	11	.0006	18	3660	1.6	36	33
3	Bleached Sulphite....	22	.0019	11	49	123.	21	44
4	Glassine	38	.0020	19	3000	2.0	44	29
5	Dry Waxed Sulphite.	27	.0021	13	116	52.	79	10
6	Wet Waxed Sulphite.	32	.0019	17	1045	0.6	965	0.87
7	Cellophane (non-moisture proof).....	39	.0017	23	6340	0.9	30	40
8	Cellophane (moisture-proof) 2 thicknesses	44	.0020	22	12200	0.5	1600	0.58
9	Rubber Sheeting (dental dam).....	152	.0107	14	14400	0.4	49000	0.71

1. Amount of Water in Can

Tests were made by adding 25, 50, 75 and 100 cc of water respectively to the sets of cans. These cans were placed on a shelf where convection currents were the same on each can but where the air velocity was too low to measure by an anemometer. The cans were allowed to stand for 24 hours and the vapor transmission rate then calculated. The results shown in Chart 1 indicate that the transmission rate is practically constant if the quantity of water in the can is maintained fairly closely.

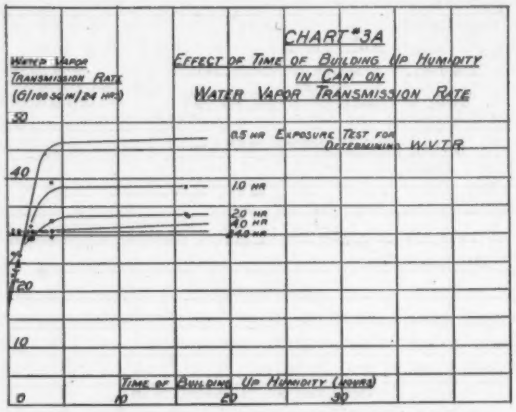
2. Air Velocity Over the Can

In these tests 50 cc of water were added to each can, the cans were then placed before the fan at different points and the air velocities measured with an anemometer. The results shown in Chart 2 indicate that the V. T. R. decreases slightly with decreased velocity but in the range from 250 to 600 F. P. M. the difference is only about 5 per cent.

Tests run on a shelf where only normal convection currents were obtained, with velocities too low to be measured by the anemometer, show that the V.T.R. is approximately 5 per cent lower than where the rate was 250 f.p.m. thereby suggesting that a positive "sweeping" action is desirable over the test sample. Hence the proper way for carrying out the test is to set the can before a fan at such a distance as to obtain a specified air velocity. For example, with a 12 inch fan running on low speed, a velocity of approximately 650 f. p. m. is obtained at a distance of 20 inches from the fan.

3. Time of Exposure

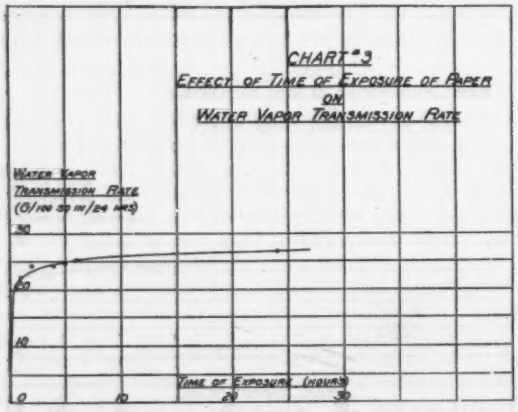
The question arose as to whether the V.T.R. should be determined by a short or long exposure to water vapor. We therefore placed test samples at a definite distance from the fan, weighed these at intervals, and then calculated the V.T.R. to the 24 hour basis. The results shown in Chart 3 indicate that the rate increases rather sharply in the initial period up to about 10 hours; and thereafter increases only very slightly.



We therefore determined whether this low initial rate was due to saturation of the sheet itself by first weighing the sheets placed on the cans, exposing them for different intervals and then removing the sheets from successive cans to determine the increase in weight. At the same time the normal V.T.R. was calculated, both with and without correction for sheet absorption. As shown in Table 2 the absorption of the sheet was so slight that the lower initial V.T.R. could not be attributed to this.

It then seemed desirable to see whether this lower initial V.T.R. was due to the fact that the air in the can required some time for complete saturation. Cans were covered with sheeting and allowed to stand for various lengths of time in order that the air might saturate. The sheets were then quickly removed, new sheets placed on and the V.T.R. determined by weighing at definite intervals and calculating to a 24 hour basis.

The results are shown in Chart 3A. They indicate quite definitely that an initial saturation of the air increases the vapor transmission rate, particularly if this saturation period is followed by a short evaporation period for determining the V.T.R.; but that this effect of initial saturation is constant after a period of 4 hours. However it is equally well shown that, regardless of the initial



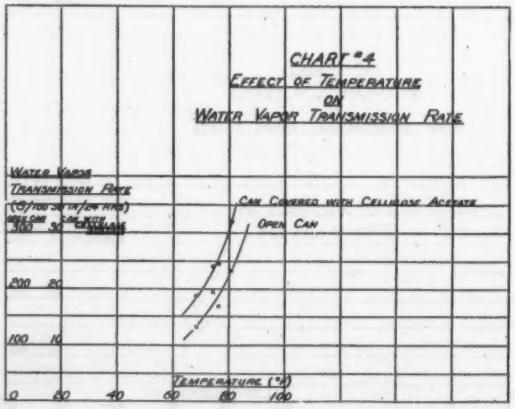


TABLE 2
EFFECT OF SHEET ABSORPTION ON VAPOR TRANSMISSION RATE

Time of Exposure to Water Vapor	Weight of Paper		Water Vapor Transmission Rate (g/100 sq. in./24 hrs.)	
	Before Exposure	After Exposure	As is	Corrected for paper absorption
0.5 hr.	0.1265 gram	0.1268 gram	27.5	27.3
1.0 hr.	0.1166 gram	0.1167 gram	32.7	32.7
2.0 hr.	0.1096 gram	0.1099 gram	30.7	30.7
4.0 hr.	0.1120 gram	0.1108 gram	32.9	32.6
6.0 hr.	0.0922 gram	0.0923 gram	34.8	34.8

saturation period, it is necessary to run the evaporation test for at least 6 hours to arrive at a V.T.R. which is substantially constant.

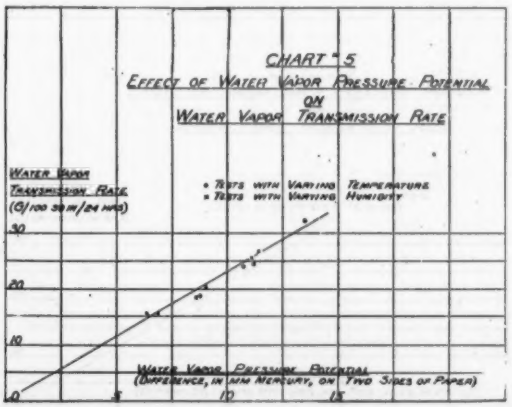
Hence the indications are that the low initial V.T.R. on short time evaporation tests is apparently due to incomplete saturation of air in the can; but that there is nothing to be gained either in time or accuracy of tests by starting with cans having saturated air.

4. Temperature

This series of tests was made in a room with 50 per cent humidity, by changing the temperature through as wide a range as could be done conveniently. In Chart 4 are shown the results of exposing cans covered with the cellulose acetate sheeting and also those cans over which no sheeting was placed. The temperature range was not as great as we desired but it is noteworthy how much the temperature affects the V.T.R. If the temperature curve is compared with a similar one for water vapor pressures at corresponding temperatures the marked resemblance is observed; or the corollary is that if one charts the difference in water vapor pressure on the two sides of the sheet against the V.T.R. a straight line relation is obtained (Chart 5).

5. Humidity Outside the Can

Two sets of humidity tests were made—one set using desiccators containing mixtures of sulphuric acid and water of such concentrations as to give the desired humidity; the other set in a room maintained at 70 deg. F. but with varying humidities. In the former case it is apparent that the only circulation is due to convection in the desiccators, while in the latter a positive air circulation of 580 f.p.m. was maintained during the tests. The results shown on Chart 6 indicate that the desiccator tests are apparently open to the objection that lack of proper convection gives erratic data. On the other hand tests made with ample circulation and

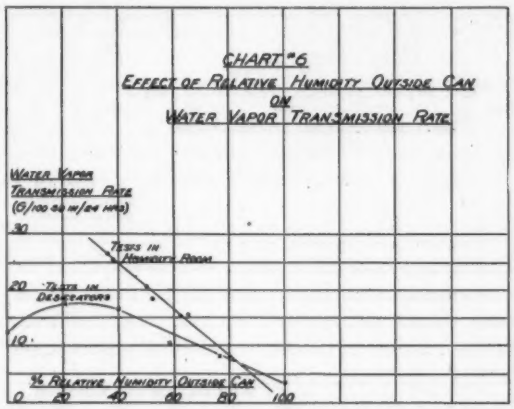


by varying the humidity in the room give a straight line which passed through zero transmission at 100 per cent humidity—which it is reasonable to expect since the humidity is then the same on both sides of the paper.

Here again we find that the differences in vapor pressure on the two sides of the paper (or water vapor pressure "potential") is the controlling factor in V.T.R.; and the points fall in well with those from the temperature experiments (Chart 5).

6. Open Can vs. Can With Paper

It was suggested that it might be possible to run an open can containing water each time that a test was made on a closed can covered with paper, the idea being that a percentage evaporation could then be worked out for the paper. This method would have the advantage that it could be made under any condition of temperature and humidity. We therefore made tests to see whether such a percentage V.T.R. could be worked out under different conditions. In view of the fact that evaporation from the open can was high, it was necessary to add 100 cc. of water to each can used



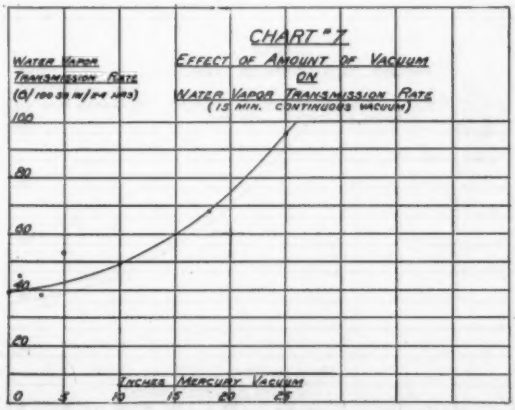
in these tests. The results shown in Table 3 indicate that the ratio of evaporation in the closed can to that of the open can is dependent upon the conditions under which the test is made, and therefore the method would not be applicable for standard testing.

7. Used vs. Unused Paper

The question arose as to whether water vapor transmission through a paper would alter its structure to such an extent as to change the V.T.R. We took a paper which had been exposed for 24 hours to water vapor, allowed it to air-dry and then retested it together with samples of the same sheeting but not previously used. Results shown in Table 4 indicate that the V.T.R. is substantially the same on the two sheets.

8. Tests Made Under Vacuum

It was believed that the time of test could be shortened con-



siderably if the cans were exposed to vacuum during the test period. Our investigation covered the effect of amount of vacuum, time of exposure to vacuum and also the difference between continuous and intermittent application of vacuum. In each case 50 cc. of water were added to the can, the paper was attached and the assembly placed in a vacuum desiccator. A mercury column was used for reading the amount of vacuum.

In the first tests, cans were exposed to varying amounts of vacuum (up to 25 inches) for periods of 15 minutes. The results plotted in Chart 7 show that the V.T.R. is very materially increased by high vacuum.

TABLE 3
WATER VAPOR TRANSMISSION RATE—OPEN CAN VS. CAN WITH PAPER

Humidity	Temperature	Air Velocity (f.p.m.)	Vapor Transmission Rate (g/100 sq. in./24 hrs.) Can with paper	Open can	Ratio Can with paper / Open can
50%	72° F.	On shelf	23.6	141	16.7%
51%	70° F.	480	21.0	772	2.7%
53%	76° F.	480	31.0	925	3.3%

TABLE 4
WATER VAPOR TRANSMISSION RATE—UNUSED VS. USED PAPER

Condition of Sheet	Vapor Transmission Rate (g/100 sq. in./24 hrs.)
Used	38.5
Unused	38.1

The effect of time of exposure to vacuum was determined by placing the can assembly under a 3 inch vacuum for a certain period. Then fresh samples of paper were placed on the can and a longer period used. This procedure was repeated until the continuous exposures ranged from 5 minutes to as high as 120 minutes.

The data in Chart 8 bring out the fact that the vapor transmission rate is extremely high at the start but drops to a constant low level after 20 minutes exposure.

For comparison with these results open cans were placed under the same vacuum for corresponding periods. It will be noted (Chart 8) that the same type of result was obtained but with much higher rates.

Tests were also made in which ten 1 minute exposures to vacuum were made but with varying times between exposure. This phase of the work is still under consideration and the results will require further study.

It seemed probably that some relation could be worked out between the vapor transmission rates on papers, testing them by the regular fan method and also by exposing them to a 3 inch vacuum for a definite period of time, e.g. 20 minutes. Such a comparison was made on a number of papers, with the results shown in Chart 9. It is evident that there is a definite relation between these two methods but we have not yet had an opportunity to investigate this subject thoroughly.

In considering the possible use of vacuum for carrying out the vapor transmission test, the method has the advantage of coming to a constant rate much more quickly than does the "fan" method using a constant temperature and humidity room. Moreover it

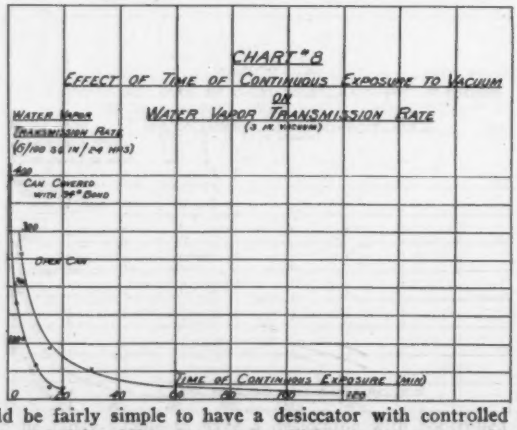


CHART 8
EFFECT OF TIME OF CONTINUOUS EXPOSURE TO VACUUM ON WATER VAPOR TRANSMISSION RATE
(3 in. vacuum)
WATER VAPOR TRANSMISSION RATE (G/100 SQ IN/24 HRS)
CAN COVERED WITH 28# BOND
OPEN CAN
TIME OF CONTINUOUS EXPOSURE (MIN)

would be fairly simple to have a desiccator with controlled temperature and humidity—because it will be necessary to maintain a fixed vapor pressure differential on the two sides of the paper. However, the short test period involved would show such a slight actual evaporation on highly moistureproof sheets that there would be the possibility of errors in weighing, and hence corresponding inaccuracy in the V.T.R.

9. Suggested Tentative Standard Method

The foregoing experiments have shown conclusively that any method for testing vapor transmission rate through papers must be controlled carefully if reliable results are to be obtained.

In Table 5 we have taken a range in the important factors bearing on the vapor transmission test and have calculated the approximate percentage effect of each on the vapor transmission rate. Consideration of the method shows that it is relatively simple to control the time of exposure, air velocity and amount of water in the can so that these will not influence the V.T.R. by more than 1 or 2 per cent. However, the humidity surrounding the can during the test is very much more important, while adequate temperature control is of the utmost importance.

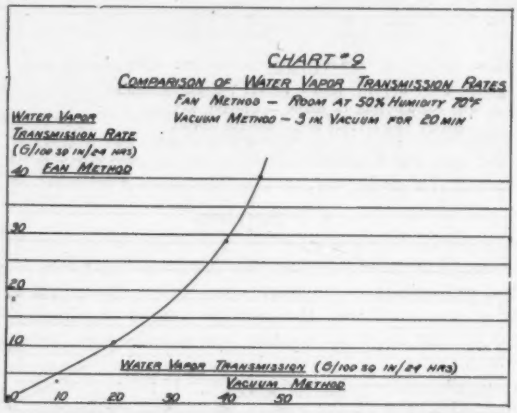


CHART 9
COMPARISON OF WATER VAPOR TRANSMISSION RATES
FAN METHOD — ROOM AT 50% HUMIDITY 70°F
VACUUM METHOD — 3 IN. VACUUM FOR 20 MIN
WATER VAPOR TRANSMISSION RATE (G/100 SQ IN/24 HRS)
FAN METHOD
WATER VAPOR TRANSMISSION (G/100 SQ IN/24 HRS) VACUUM METHOD

We therefore suggest tentatively that the test be made by placing 50 cc. of distilled water (or other liquid if test against its vapor is desired) into the aluminum can, whereupon the sheet of paper is attached firmly to the top thus exposing an area of 7.07 sq. in. to the water vapor (or vapor of other liquid if desired). The can is weighed at once to 0.1 mg. Duplicate cans are then placed in a room maintained at 70 deg. F. and 50 per cent humidity (or 65 per cent if more generally available—although this will considerably reduce the water V.T.R.). The cans are set before an electric fan at such a distance as to give an air velocity of about 600-700 f.p.m. (With the 3 speeds of the ordinary 12 inch electric fan this will be between 15 and 55 inches.)

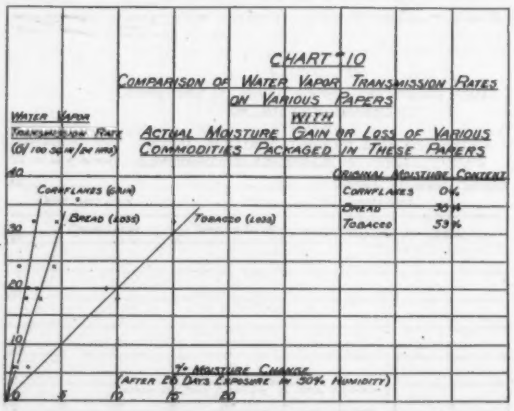


CHART 10
COMPARISON OF WATER VAPOR TRANSMISSION RATES ON VARIOUS PAPERS WITH ACTUAL MOISTURE GAIN OR LOSS OF VARIOUS COMMODITIES PACKAGED IN THESE PAPERS
WATER VAPOR TRANSMISSION RATE (G/100 SQ IN/24 HRS)
ORIGINAL MOISTURE CONTENT
CORNFLAKES (GAIN)
BREAD (LOSS)
TOBACCO (LOSS)
% MOISTURE CHANGE (AFTER 20 DAYS EXPOSURE AT 50% HUMIDITY)

After a period of 6 hours exposure (or from there up to 24 hours, through which range a variation of about 6 per cent in V.T.R. may be expected) the can assembly is removed and reweighed. The difference in weight is then multiplied by 14.1 to convert the result to 100 sq. in. of exposure surface; and by the necessary time factor to convert to the 24-hour period. With any standard length of test period a factor may be used which converts for area and time simultaneously. For example,

Time of test period	Conversion factor
6 hrs.	56.4
8 hrs.	42.3
12 hrs.	28.2
24 hrs.	14.1

TABLE 5
INFLUENCE OF VARIOUS FACTORS ON WATER VAPOR TRANSMISSION RATE

Factor	Range over which varied	Total % effect on V.T.R. (calculated on minimum rates)	Approximate amt. factor may vary to produce 1% change in V.T.R.
Time of Exposure.....	6— 24 hrs.	6%	3 hrs.
Amt. of water in can ...			
Velocity of air over can.	200—600 f.p.m.	4%	100 f.p.m.
Humidity outside can...	50— 65%	45%	½ %
Temperature	65— 80° F.	85%	½°
Vacuum	0— 15 ins. mercury	65%	¼ inch

TABLE 6
TRANSMISSION RATES THROUGH CELLULOSE ACETATE OF VAPORS FROM ORGANIC LIQUIDS

Liquid	Formula	Molecular Weight	Boiling Point (0° F.)	Vapor Pressure (mm Hg at 68° F.)	Vapor Transmission Rate (g/100 sq. in./24 hrs.) at 73° F.
Aceton	C_3H_6O	58	133	180	560*
Benzol	C_6H_6	78	177	76	5
Carbon Disulphide...	CS_2	76	115	298	30
Carbon Tetrachloride.		154	169	91	10
Chloroform	$CHCl_3$	119	142	160	750*
Ethyl Ether.....	$C_4H_{10}O$	74	95	433	76

* Dissolves cellulose acetate.

In case the temperature and humidity cannot be controlled closely, recording instruments may be installed and the average readings determined. The proper corrections may then be made to reduce the V.T.R. to the standard temperature and humidity—in other words correcting the V.T.R. to a vapor pressure potential of 9 mm. The V.T.R. is then reported e.g. as "grams per 100 sq. in. per 24 hrs. at 50 per cent humidity and 70 deg. F."

10. Comparison of V.T.R. with Packaging Experiments

The ultimate value of any method for testing paper lies in its ability to predict reliably what that paper will do under actual service conditions. To test out our suggested method we took a series of wrapping papers, varying considerably in their resistance to water vapor and determined their V.T.R.'s by the foregoing method. Then we took the same paper and wrapped

(a) moist loaves of bread (36 per cent moisture) where it was desired to keep moisture in the package.

(b) moist shredded tobacco (53 per cent volatile at 100 deg. C., including moisture) where it was also desired to keep moisture in the package.

(c) crackers which were first dried to 0 per cent moisture at 100 deg. C., and where it was desired to keep moisture out of the package.

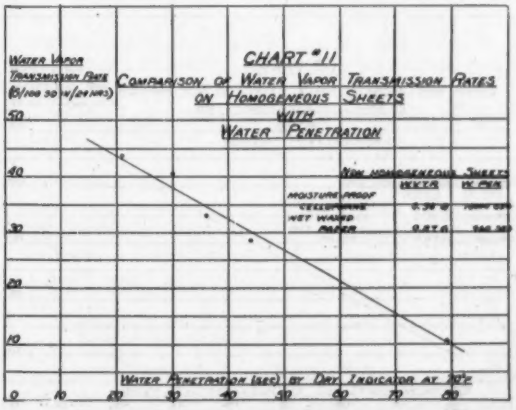


CHART #11
COMPARISON OF WATER VAPOR TRANSMISSION RATES ON HOMOGENEOUS SHEETS WITH WATER PENETRATION
WATER VAPOR TRANSMISSION RATE (G/100 SQ IN/24 HRS)
MOISTUREPROOF CELLOPHANE
WET WAXED PAPER
NON-HOMOGENEOUS SHEETS
WATER PENETRATION (SEC) BY DRY INDICATOR AT 70°F

Insofar as possible all packages were made of the same size and shape and all were carefully sealed with paraffin wax. The contents were weighed previous to packaging, then the total package was weighed and all packages were exposed in a room at 50 per cent humidity and 70 deg. F. Weighings were made at intervals and at the end of 26 days final weighings were made and all results calculated to per cent moisture loss or gain (on the original weight) as the case may be.

These results (Chart 10) show that the V.T.R.s on various papers agree satisfactorily with the actual moisture losses through the packages; and that the method therefore predicts reliably the usage performance of a paper.

11. Water Vapor Transmission vs. Water Penetration

Water V.T.R.'s were run by the standard method on a number of papers having approximately the same calipers but otherwise quite different in properties (Table 1, Samples 3 to 8 inclusive). The reason for selecting approximately equal calipers is that the water resistance of papers is, according to Carson,[1] proportional to the square of the thickness. The samples were tested for water penetration using the dry indicator method at 70 deg. F.; and the results are shown in Table 1 and Chart 11. A satisfactory agreement of the two tests is found in the case of sheets which are homogeneous throughout, but not in the case of non-homogeneous papers. For example, a dry waxed sheet would be considered as a homogeneous mixture of fibers and paraffin wax, while a wet waxed sheet would be considered as heterogeneous since it not only has a mixture of fibers and wax but also an additional surface coating of wax. Incidentally the V.T.R.'s on properly wet-waxed papers may run as low as 0.20 g.

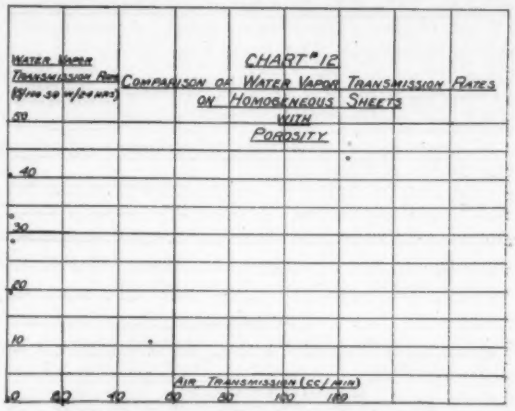


CHART #12
COMPARISON OF WATER VAPOR TRANSMISSION RATES ON HOMOGENEOUS SHEETS WITH POROSITY
WATER VAPOR TRANSMISSION RATE (G/100 SQ IN/24 HRS)
AIR TRANSMISSION (CC/MIN)

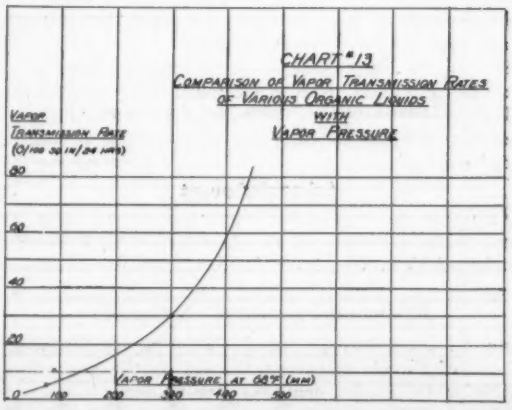


CHART #13
COMPARISON OF VAPOR TRANSMISSION RATES OF VARIOUS ORGANIC LIQUIDS WITH VAPOR PRESSURE
VAPOR TRANSMISSION RATE (G/100 SQ IN/24 HRS)
VAPOR PRESSURE AT 68°F (MM)

Similarly, moistureproof cellophane is non-homogeneous because it consists of films of dissimilar characteristics. The results on the rubber sheeting (after proper correction for caliper) would seem to be comparable to those for heterogeneous sheets since the water penetration time is unduly high for the water vapor transmission rate.

12. Water Vapor Transmission vs. Porosity

Comparisons were made of various sheets (Table 1 all samples)

[1] Measurements of the Degree of Sizing of Paper, Technical Papers of the B. of S., No. 326, p. 724.

to see whether any relation existed between the air transmission rate of a sheet and its V.T.R. The porosities were determined by the Gurley Densometer.

The results of these tests are shown in Chart 12. It is quite obvious that the points are so widely scattered that no true relation exists between the tests, even in the case of homogeneous papers.

13. Vapor Transmission Rates With Organic Liquids

A celluloseacetate sheeting (Table 1, No. 2) was used for these tests. Several organic liquids were selected for test purposes with a view to having enough difference in vapor pressures as to give a fair range in that property. 100 cc. of the liquid were placed in the test can, the sheeting attached, the assembly weighed and set in a room with an air velocity over the cans of 430 f.p.m. At the end of 24 hours the cans were reweighed and the V.T.R. calculated to the standard condition.

The results (Chart 13) show a satisfactory agreement between the vapor pressures of the liquids and the V.T.R.'s. However, in the case of acetone and chloroform the V.T.R.'s were disproportionately high, but this is accounted for by the fact that both of these exert a solvent effect on cellulose acetate.

Conclusions

1. The rate of water vapor passage through papers is largely dependent on the vapor pressure "potential" (i.e. the difference in vapor pressure) on the two sides of the paper. In turn this difference in pressure is largely dependent on the temperature and humidity under which the test is carried out. These conditions, therefor, require very careful regulation if dependable results are to be obtained.

2. Testing V.T.R. under vacuum appears to offer some simplification of equipment but at the same time the shorter test periods involve a lower degree of accuracy in results, particularly with sheets of high moisture proofness.

3. The tentative standard method suggested herein gives results which are directly comparable with the results of moisture losses in actual packaging experiments using the same papers.

4. The ratio between water vapor loss from an open can and from a can covered with paper is not constant under varying test conditions; therefore this simple method can not be adopted for standard usage.

5. Water vapor transmission rates bear a direct relation to liquid water penetration tests on homogeneous papers but this relation does not hold for heterogeneous papers.

6. Porosity, or air penetration through a sheet, bears no direct relation to the water vapor transmission rate through the sheet.

7. The transmission rate of the vapor of an organic liquid at any temperature is a function of the vapor pressure of that liquid, provided the liquid does not exert a solvent effect on the sheet.

Acknowledgment

For many of the tests in the preparation of this paper we are indebted to the assistance of W. H. Graebner, K. Rodehaver, R. Hollands and C. L. Wagner.

Maritime Provinces of Canada

From an illustrated pocket-size booklet on the Maritime Provinces of Canada recently published by the Department of the Interior the reader can in a few moments acquire much authoritative information about the progress and potentialities of New Brunswick, Nova Scotia and Prince Edward Island, their principal resources and development.

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Northern N. Y. Superintendents Convene

SYRACUSE, N. Y., October 25, 1930.—The Fall meeting of the Northern N. Y. Division of the American Pulp and Paper Mills Superintendents' Association, which was held here in a one-day session, was attended by almost seventy-five members and guests.

H. R. Heuer, of the Newton Falls Paper Company, Newton Falls, N. Y., was elected chairman; A. G. Wighman, Knowlton Bros., Watertown, N. Y., 1st vice-chairman; R. D. Millidge, Frank Smith Paper Company, Cornwall, Ont., 2nd vice-chairman; Frank Johnson, Sherman Paper Company, Felts Mills, N. Y., 3rd vice-chairman, and R. W. Hynes, Newton Falls Paper Company, was elected secretary and treasurer.

At the banquet in the evening, held at the Hotel Syracuse, the toastmaster, L. D. Post, briefly outlined the program of the American Pulp and Paper Mill Superintendents' Association, from the date of its inception. Dean Hugh P. Baker, of the College of Forestry, University of Syracuse, was then introduced as the speaker of the evening.

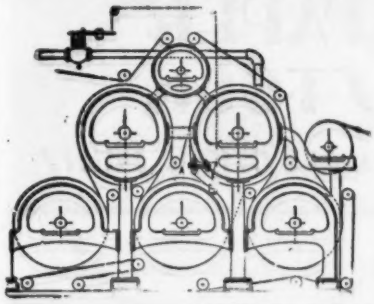
Dr. Baker stressed the importance of trade association in general and their influence on the industries they represent. In outlining the basic principle of trade associations he emphasized the necessity of a reasonable sporty adherence by the members, to what he termed "The Rules of the Road." Dr. Baker recommended a thorough study of all factors entering into the manufacturer of paper and to obtain complete and actual facts relating to every phase of the industry. Pointing out that the present problems confronting the industry are identical with those which existed in the year 1878, at which time over production and unsatisfactory profits were the inspiration for the first meeting of the association. Dr. Baker claimed that these conditions could be largely overcome by a close comparison of costs by individual members (but not to set up an average cost which would be illegal), to insure a fair profit—the maintenance of high standard and equality of products—disapproval of the practice of exchange of customers—elimination of price cutting—satisfactory business terms and the support of statistical and technical research. These are the "Rules of the Road." In closing Dr. Baker pointed out that any trade association which is to be successful must be adequately financed and efficiently managed.

The morning session, held at Hotel Syracuse, was called to order by Chairman John H. Brougham. A paper on "Compensating Press Roll Drives" was delivered by "Don" Montrille, of S. Shartle Bros., Middletown, Ohio, followed by a discussion of the subject in which William G. Webb representing the Sandy Hill Iron & Brass Works described a differential device his company was developing to show slippage of rolls. This synchronizing device is now in operation. At the request of E. B. Eddy, Montreal Paper Products Company, Carthage, N. Y., C. G. Clinch, of same company explained that by another method which they employed they could automatically synchronize the speed of paper machines. During a round table discussion M. J. Argy presented a paper on "Felt Drier Seams." Levi A. Frolick, Algonquin Paper Mills, Ogdensburg, N. Y., reviewed his experience with pulp stones and praised highly the efficiency of the Norton product.

After luncheon the members visited the college of Forestry where the afternoon session was held. The following papers were presented. "Tensilastic Rubber Rolls," by W. E. Brown, sales manager, American Wringer Company, Woonsocket, R. I.; "Modern Paper Making Machinery," by Roy F. Hayes, sales engineer, Bagley & Sewall Company, Watertown, N. Y.; "Sizing," by F. M. Williams, president, Williams Apparatus Company, Watertown, N. Y.

Robert L. Eminger, national secretary addressed the members as a national representative and delivered a message from Carl Magnus, president of the association. He stated that the next meeting of the American Pulp and Paper Mill Superintendents Association would be held at Dayton, Ohio, June 4-5-6-7, 1931.

The Pickles Drying Regulator



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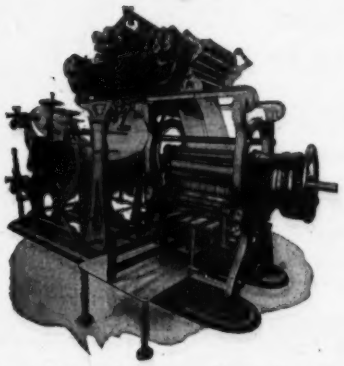

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IMPORTS OF PAPER AND PAPER STOCK

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING OCTOBER 25, 1930

SUMMARY

Cigarette paper	1,688 cs.
Wall paper	16 cs.
Paper hangings	5 bls., 3 cs.
News print	22,649 rolls
Printing paper	41 rolls, 52 bls., 122 cs.
Wrapping paper	5 bls., 40 cs.
Tissue paper	2 cs.
Filter paper	89 bls., 13 cs.
Drawing paper	53 cs.
Photo paper	12 cs.
Gold coated paper	7 cs.
Metal coated paper	137 cs.
Coated paper	6 cs.
Surface coated paper	6 bls., 42 cs.
Baryta coated paper	10 cs.
Parchment paper	1 roll
Colored paper	22 cs.
Decalcomania paper	14 cs.
Writing paper	37 cs.
Silk paper	1 cs.
Stencil paper	2 cs.
Envelopes	190 bdls., 20 cs.
Gummed paper	3 cs.
Paste board	9 cs.
Miscellaneous paper	380 rolls, 78 cs.

CIGARETTE PAPER

American Tobacco Co., J. Cartier, Bordeaux, 800 cs.
Liggett & Myers Tobacco Co., J. Cartier, Bordeaux, 12 cs.
De Manduit Paper Corp., Schodack, Havre, 97 cs.
Standard Products Corp., Ile de France, Havre, 77 cs.
De Manduit Paper Corp., Vincent, Havre, 149 cs.
H. H. Strauss, Vincent, Havre, 546 cs.
British American Tobacco Co., Berengaria, Southampton, 7 cs.

WALL PAPER

Thomas & Pierson, American Trader, London, 1 cs.
Globe Shipping Co., Pr. Harding, Hamburg, 1 cs.
Guaranty Trust Co., Deutschland, Hamburg, 14 cs.

PAPER HANGINGS

W. H. S. Lloyd & Co., Caronia, London, 4 bls., 2 cs.
Whiting & Patterson Co., Inc., Olympic, Southampton, 1 ble., 1 cs.

NEWS PRINT

Bank of Montreal, Cornerbrook, Cornberbrook, 11,221 rolls.
W. H. Bell, Markland, Liverpool, N.S., 3,710 rolls.
J. Madden Corp., Dresden, Bremen, 815 rolls.
Perkins, Goodwin & Co., Dresden, Bremen, 54 rolls; Cleveland, Hamburg, 190 rolls.
International Paper Co., Sud Cubano, Dalhousie, N. B., 5,699 rolls.
——, Deutschland, Hamburg, 491 rolls.
Perkins, Goodwin & Co., Deutschland, Hamburg, 469 rolls.

PRINTING PAPER

T. N. Fairbanks, Excelsior, Genoa, 51 cs.
F. L. Kramer, Caronia, London, 2 cs.
——, Dresden, Bremen, 25 cs.
International F'd'g Co., E. Francqui, Antwerp, 21 cs.
E. Dietzgen & Co., Volendam, Rotterdam, 15 cs.
J. Beckhard, Europa, Bremen, 1 cs.
L. Schulman Co., Europa, Bremen, 25 rolls.
Japan Paper Co., Europa, Bremen, 4 cs.
Keuffel & Esser Co., Pr. Harding, Hamburg, 16 rolls.
T. N. Fairbanks, Berengaria, Southampton, 3 cs.
Perkins, Goodwin & Co., Deutschland, Hamburg, 52 bls.

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Atlantic F'd'g Co., Deutschland, Hamburg, 22 cs.

TISSUE PAPER

W. J. Byrnes, Olympic, Southampton, 2 cs.

FILTER PAPER

A. Giese & Son, J. Cartier, Antwerp, 89 bls.
H. Reeve Angel & Co., Inc., Caronia, London, 13 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., Caronia, London, 3 cs.
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PHOTO PAPER

J. H. Schroeder Banking Corp., Dresden, Bremen, 3 cs.
J. J. Gavin, Olympic, Southampton, 3 cs.
J. H. Schroeder Banking Corp., Europa, Bremen, 3 cs.
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GOLD COATED PAPER

F. Murray Hill Co., Dresden, Bremen, 7 cs.

METAL COATED PAPER

W. Wrigley, E. Francqui, Antwerp, 125 cs.
K. Pauli Corp., Dresden, Bremen, 7 cs.
Globe Shipping Co., Deutschland, Hamburg, 1 cs.
——, Deutschalnd, Hamburg, 1 cs.
Titan Shipping Co., Deutschland, Hamburg, 3 cs.

COATED PAPER

W. A. Foster & Co., Minnewaska, London, 6 cs.

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P. C. Zuhlke, Pennland, Antwerp, 7 cs.
Gevaert Co. of America, Pennland, Antwerp, 34 cs.
Quality Art Novelty Co., Deutschalnd, Hamburg, 6 bls.
Phoenix Shipping Co., Deutschland, Hamburg, 1 cs.

BARYTA COATED PAPER

J. H. Schroeder Banking Corp., Europa, Bremen, 10 cs.

PARCHMENT PAPER

International F'd'g Co., Dresden, Bremen, 1 roll.

COLORED PAPER

Borden Riley Paper Co. Pennland, Antwerp, 7 cs.
Tamm & Co., Volendam, Rotterdam, 7 cs.
D. F. Young, Deutschland, Hamburg, 3 cs.
Titan Shipping Co., Deutschland, Hamburg, 5 cs.

DECALCOMANIA PAPER

Phoenix Shipping Co., Dresden, Bremen, 1 cs.
C. W. Sellers, Europa, Bremen, 2 cs.; Deutschland, Hamburg, 10 cs.
Phoenix Shipping Co., Deutschland, Hamburg, 1 cs.

WRITING PAPER

American Express Co., Schodack, Havre, 2 cs.
L. Bamberger & Co., Schodack, Havre, 1 cs.
R. F. Downing & Co., Ile de France, Havre, 2 cs.
J. D. Smith & Co., Ile de France, Havre, 1 cs.
R. H. Macy & Co., Inc., Ile de France, Havre, 5 cs.
B. Altman & Co., Olympic, Southampton, 6 cs.
American Express Co., Olympic, Southampton, 2 cs.
Guibout Freres, Olympic, Southampton, 5 cs.
Globe Shipping Co., Vincent, Havre, 2 cs.
L. Bamberger & Co., Vincent, Havre, 2 cs.
American Express Co., Vincent, Havre, 2 cs.
Bloomingdale Bros., Vincent, Havre, 2 cs.
Japan Paper Co., Berengaria, Southampton, 3 cs.
Coenca Morrison Co., Berengaria, Southampton, 1 cs.
Globe Shipping Co., Deutschland, Hamburg, 1 cs.

SILK PAPER

Whiting & Patterson Co., Inc., Volendam, Rotterdam, 1 cs.

STENCIL PAPER

Plusacopy Corp., Europa, Bremen, 1 cs.
E. Rosenberg, Europa, Bremen, 1 cs.

ENVELOPES

Satisfaction Supply Co., Volendam, Rotterdam, 190 bdls.
J. Beckhard, Europa, Bremen, 20 cs.

GUMMED PAPER

——, Deutschland, Hamburg, 3 cs.

PASTE BOARD

Colmar Paper Corp., Pennland, Antwerp, 9 cs.

MISCELLANEOUS PAPER

American Express Co., Schodack, Havre, 2 cs.
W. von Doorn, Volendam, Rotterdam, 20 rolls.
C. Bruning & Co., Volendam, Rotterdam, 50 rolls.
Globe Shipping Co., Volendam, Rotterdam, 39 cs.
J. Beckhard & Co., Volendam, Rotterdam, 8 cs.
Keller Dorian Paper Co., Ile de France, Havre, 11 cs.
Bush Service Corp., Ile de France, Havre, 3 cs.
——, Pr. Harding, Hamburg, 310 rolls.
Watch Tower Bible & Tract Society, Deutschland, Hamburg, 2 cs.
F. Weber & Co., Saturnia, Trieste, 13 cs.

RAGS, BAGGINGGS, ETC.

E. J. Keller Co., Inc., J. Cartier, ——, 191 bls. new rags.; 108 bls. flax waste.
Walker Goulard Plehn Co., J. Cartier, Havre, 2 bls. cuttings.
V. Galaup, J. Cartier, Havre, 40 bls. cuttings
Bank of N. Y. & Trust Co., J. Cartier, Dunkirk, 108 bls. rags.
Banco Coml. Italiane Trust Co., Excelsior, Genoa, 113 bls. bagging.
D. M. Hicks, Inc., Schodack, Dunkirk, 51 bls. flax waste.
Royal Manfg. Co., Lepanto, Antwerp, 16 bls. thread waste.
Katzenstein & Keene, Inc., Lepanto, Antwerp, 212 bls. rags.
Bank of N. Y. & Trust Co., Dresden, Bremen, 45 bls. rags.
National Shawmut Bank, Anaconda, Antwerp, 6 bls. thread waste.
Darmstadt Scott & Courtney, Vincent, Havre, 120 bls. rags; Vincent, Dunkirk, 55 bls. bagging.
Banco Coml. Italiane Trust Co., Giulia, Naples, 131 bls. bagging; Birk, Savona, 325 bls. bagging; Tagliamento, Genoa, 103 bls. bagging.

OLD ROPE

G. W. Millar & Co., Lepanto, Hull, 62 coils.

WOOD PULP

Castle & Overton, Inc., Cleveland, Hamburg, 2,030 bls. wood pulp, 302 tons.

PULP WOOD

Chase National Bank, Carperby, Archangel, 3,723 cords; Cragpool, Archangel, 3,810 cords; Wallaby, Archangel, 2,280 cords.

WOOD FLOUR

The Burnet Co., Volendam, Rotterdam, 300 bags.
State Chemical Co., Volendam, Rotterdam, 400 bags.

BOSTON IMPORTS

WEEK ENDING OCTOBER 25, 1930

Peiepscot Paper Co., Lepanto, Hull, 150 coils old rope.
Brown Bros. & Co., Lepanto, Hull, 90 coils old rope; 98 bls. old yarn.
Webster Atlas Natl. Bank, Lepanto, Antwerp, 18 bls. of flax waste.
Spaulding Fibre Co., Lepanto, Antwerp, 582 bls. flax waste.
——, Lepanto, Antwerp, 90 bls. bagging.
Darmstadt Scott & Courtney, Lepanto, Antwerp, 33 bls. cotton waste.

(*Continued on page 184*)

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High quality Casein made under strict laboratory control. Excellent solubility. Satisfactory viscosity. Write for sample and quotations.

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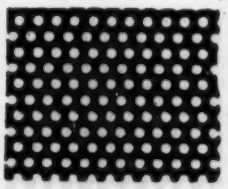

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GRIFFITH-HOPE CO., West Allis, Wisc.

Imports of Paper and Paper Stock

(Continued from page 182)

V. Galaup, Lepanto, Antwerp, 79 bls. rags.
F. D. Sawyer Co., Lepanto, Antwerp, 12 bls. thread waste.

PORTLAND IMPORTS

WEEK ENDING OCTOBER 25, 1930

Chase National Bank, Wallaby, Archangel, 400 cords, pulpwood.
Waterfalls Papermills Co., Giulia, Trieste, 5,250 bls., Wood pulp.

PHILADELPHIA IMPORTS

WEEK ENDING OCTOBER 25, 1930

Guaranty Trust Co., J. Cartier, Havre, 186 bls. rags.
Castle & Overton, Inc., J. Cartier, Havre, 5 bls. cuttings.
——, J. Cartier, Havre, 50 bls. rags.
Banco Coml. Italiane Trust Co., J. Cartier, Havre, 246 bls. rags.
——, J. Cartier, Dunkirk, 135 bls. rags.
E. J. Keller Co., Inc., J. Cartier, ——, 122 bls. rags.
Brown Bros. & Co., J. Cartier, Dunkirk, 51 bls. rags.
W. Heisley Co., J. Cartier, Dunkirk, 4 bls. rags.
Philadelphia National Bank, J. Cartier, Dunkirk, 107 bls. rags.
J. A. Steer & Co., Schodack, Havre, 44 bls. rags.
Strawbridge & Clothier, Schodack, Havre, 2 cs. writing paper.
The Borregaard Co., Inc., Blankaholm, Gothenburg, 168 rolls, 2 bls. paper.
Rosenbach Co., Blankaholm, Gothenburg, 110 rolls paper.
J. Andersen & Co., Blankaholm, Gothenburg, 250 bls. sulphite.
Parsons & Whittemore, Inc., Blankaholm, Gothenburg, 600 bls. sulphite.

NORFOLK IMPORTS

WEEK ENDING OCTOBER 25, 1930

Darmstadt Scott & Courtney, Anaconda, Antwerp, 105 bls. bagging.

NEWPORT NEWS IMPORTS

WEEK ENDING OCTOBER 25, 1930

Perkins, Goodwin & Co., Blankaholm, Gothenburg, 2,601 bls. sulphate; 1,583 bls. kraft pulp.
Johanson Wales & Sparre, Inc., Blankaholm, Gothenburg, 897 bls. kraft soda pulp.

BALTIMORE IMPORTS

WEEK ENDING OCTOBER 25, 1930

M. Gottesman & Co., Inc., Blankholm, Stockholm, 1,200 bls. sulphite.
——, Blankaholm, Stockholm, 450 bls. woodpulp.
Price & Pierce, Ltd., Blankaholm, Stockholm, 4080 bls. sulphite.
Lagerloef Trading Co., Blankaholm, Helsingfors, 165 bls. wood pulp boards.
W. H. Masson, Blankaholm, Gothenburg, 17 bls., 28 rolls paper.
M. Gottesman & Co., Inc., Blankaholm, Gothenburg, 1,000 bls. sulphite.
The Borregaard Co., Inc., Blankaholm, Gothenburg, 300 bls. wood pulp.
Perkins, Goodwin & Co., Blankaholm, Gothenburg, 254 bls. sulphate.; 1,016 bls. sulphite, 4,572 bls. kraft pulp.
Parsons & Whittemore, Inc., Blankaholm, Gothenburg, 2,220 bls. sulphate; 1,350 bls. sulphite.
E. M. Sergeapt & Co., Blankaholm, Gothenburg, 1,346 bls. kraft soda pulp.
Johanson Wales & Sparre, Inc., Blankholm, Gothenburg, 2,392 bls. kraft soda pulp.

St. Helens Paper Co. To Expand

"One of the most important bits of news," says the *Sentinel* of St. Helens, Ore., "that has come to St. Helens since the positive statement the Fir-Tex plant was assured, is the announcement of the president of the St. Helens Pulp and Paper company that another unit will be added to the already huge plant and construction work will soon be under way.

"The important feature to St. Helens, as we see it, is that at least 50 additional employes will be required when the new unit is operating. Such means providing jobs for half a hundred more and the distribution of thousands of additional payroll dollars.

"The paper mill company is not hasty in its actions as to further improvement of its plant nor is it hasty in making an announcement. When it does the latter, the statement can be taken for the truth. If conditions did not look better, the company would not be encouraged to invest several hundred thousand dollars. We may look for better things from now on."

Paper Box Makers in Miami Valley Busy

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, October 27, 1930.—Considerable activity exists among the paper box manufacturing plants of this city and other towns of the Miami Valley.

Despite the so-termed depression it is a noticeable fact that mercantile concerns here and in other places are preparing rather actively for a spirited Christmas trade. The movement which has gone forward in many localities for a boosting of trade in the way of encouraging buying by members of clubs, societies, and various organizations it is believed, will have its effect in materially increasing the retail sales. Candy manufactures, department stores, and makers of any kind of a product that must be packaged in a set-up paper box, find the services of these companys indispensible especially at this time of the year when rush orders must be filled with promptness.

Virtually all of the Dayton companies and those located in Piqua, Middletown, and Hamilton maintain a fleet of trucks for speedy delivery.

Major O. M. Porter Leaves For Coast

Major O. M. Porter plans to leave for the Coast November 1, to discuss plans for the kraft paper industry's economic stabilization with West Coast manufacturers. This, is in furtherance of the National Kraft Association's program for the industry's protection and advancement through unified cooperative effort.

Champion Coated Entertains Advertising Men

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, October 27, 1930.—Seventy members of the Advertising Club of Cincinnati were guests of the Champion Coated Paper Co., at Hamilton, last Wednesday afternoon and evening. The visitors were shown through the mills, and were feted in the evening at the Butler Co. country club.

The group, with Alexander Thomson, Jr., in charge of Cincinnati office of the Company arrived at eleven o'clock, in two special buses, and following a luncheon in the Company's cafeteria, enjoyed a tour of inspection of the plant.

Mr. Thomson, Alexander Thomson, Sr., and Kenneth Hunt, advertising manager of the Champion Coated Paper Co., conducted the trip.

In the evening the Cincinnati visitors were taken to the Butler Co., country club for dinner. During a short after dinner program, the advertisers expressed their appreciation, for the days entertainment, and their pleasure in witnessing the operation of a well-equipped paper plant.

Increase Hydro-Electric Output

The International Hydro-Electric System, a division of International Paper and Power Company, produced 338,465,000 kilowatt hours of electric energy in September, a new high record for that month, and an increase of 6 per cent over the output of the present plants of the System in September, 1929.

The output of the System in the first nine months of this year was 3,048,444,000 kilowatt hours, 10 per cent greater than in the first nine months of last year, and 52 per cent greater than the output of the present plants of the System in the first nine months of 1928.

While the combined output of electric energy of all central station power plants in the United States and Canada in August—the latest figure available—decreased 5 per cent under their output in August of last year, the output of the present plants of International Hydro-Electric System increased 9 per cent. In the first eight months of this year the output of the United States and Canada was only one-half of one per cent over that of the first eight months of last year, while International Hydro-Electric System's output increased 10 per cent.

Postpone Trade Practice Rules

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 27, 1930.—The Federal Trade Commission has postponed the effective date of the revised trade practice rules in various industries until November 15. The date was to have been October 25.

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PROVIDENCE BOSTON NEW YORK PHILADELPHIA CHARLOTTE

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, October 29, 1930.

Conditions in the local paper market are fairly satisfactory. While demand for the various grades of paper is below last year's record there is little cause for complaint when the prevailing business depression is considered. Sales forces of the leading paper organizations are conducting a strenuous campaign for orders and anticipate a busy November. No radical price changes have been recorded recently.

Some improvement was noticed in the news print market. Although production during the past week was only maintained at 66 per cent of capacity in the United States and Canada, shipments went forward at 72 per cent of rating, according to information gathered by the News Print Service Bureau. Prices are holding to previously quoted levels.

Board mill output has been falling off slightly of late. The box board situation is practically unchanged. Board specialties are moving in good volume. Book papers rule fairly steady. Bond papers are quiet. Coated papers are dull but uncoated papers are in seasonal request. Demand for blotting paper is improving. The coarse paper market is rather spotty.

Mechanical Pulp

Steadiness continues to prevail in the ground wood pulp market. Production of both foreign and domestic mechanical pulp is not much ahead of consumption and offerings are not excessive. The contract movement is well up to average for the time of year. There are a fair number of inquiries for future account around. Prices are generally holding to schedule, without difficulty.

Chemical Pulp

Trading in the chemical pulp market was only moderately active during the past week. The contract movement was mainly seasonal. Opinion is expressed in some quarters that demand will become more lively in the near future. While competition for desirable business is decidedly keen, prices of the various grades are holding up fairly well.

Old Rope and Bagging

Most of the business transacted in the old rope market was along routine lines. Demand for both imported and domestic old manila rope was rather slow. Small mixed rope is in fair request. Old rope prices remain unchanged, in most instances. The bagging market is slightly easier. Roofing bagging is dull but scrap and gunny are fairly steady.

Rags

Paper mill interest in the domestic ra market is showing signs of awakening. Cotton cuttings are in somewhat better demand than of late. Roofing stock is moderately active. The position of the mixed rag market is practically unchanged. Prices of the various grades of domestic rags are fairly steady. The imported rag market is very quiet at present.

Waste Paper

Demand for the better grades of paper stock is well maintained. Offerings of hard white envelope cuttings are still scarce. Soft white and hard white shavings are in excellent request. Old kraft machine compressed bales are firm. Little change was noticed in the demand from the board mills for the lower grades of paper stock. Prices are generally regarded as too low.

Twine

Seasonal conditions prevail in the twine market. Demand for the various grades is expanding with the approach of the Christmas and New Year holidays and a busy time is anticipated from now on to the end of the year. The price situation is fairly satisfactory and quotations are generally holding to former levels, without difficulty.

R. S. Kellogg Addresses Paper Salesmen

There was an excellent attendance at the regular weekly luncheon and meeting of the New York Division of the Salesmen's Association of the Paper Industry, held last Monday at the Fraternities Club. Endicott Rantoul, vice-president, occupied the chair and discussed the kraft situation in a comprehensive manner.

R. S. Kellogg, secretary of the News Print Service Bureau, described the new Dard Hunter mill—the only hand-made paper mill in America—and also sketched the career of Dard Hunter, whom he considers the greatest craftsman in the United States. The aim of the Dard Hunter organization is to manufacture special papers for paricular purposes. The mill, which is located at Lime Rock, Conn., has been in operation since last May and nothing but the highest grades of rags are used.

Mr. Kellogg also exhibited many samples of Dard Hunter papers, the unique water-marks of which aroused particular interest. In many ways this meeting proved one of the most interesting and entertaining ever held by the association and one and all expressed their appreciation of Mr. Kellogg's instructive talk.

Unit Pulverizers in Big Island Mill

The Bedford Pulp and Paper Company has installed the pulverized fuel system of firing in its new power plant at Big Island, Va.

The unit pulverizers were selected on account of their simplicity of operation—all moving parts being outside of the furnace—high efficiency—alibity to burn several grades of coal—responsiveness to varying loads—moderate first and maintenance costs. The Strong-Scott Company of Minneapolis, Minn., was given the contract for all of the pulverized fuel system which consisted of three "Unipulvo" unit pulverizers of six thousand pounds capacity each.

Each pulverizer is to fire an Edge Moor Bent Tube Boiler of sixty-nine hundred and ninety-five square feet of heating surface at a maximum rating of three hundred percent. Each furnace is equipped with a No. 5 "Unipulvo" burner.

Ignition is obtained by a Johnson oil burner located in the front furnace wall directly under the Unipulvo burner. This burner uses either fuel oil or kerosene. Preheated air for the pulverizers is obtained from the air cooled side walls of the furnaces. Each pulverizer is driven by 100 h.p. Induction motor at 1750 r.p.m.

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INTERNATIONAL WIRE WORKS
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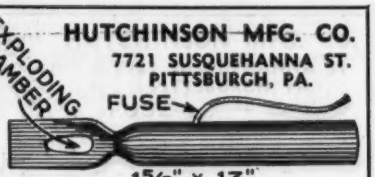
EXPLODING WEDGE FOR SPLITTING PULP WOOD
PRICE $5.00



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Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, October 29, 1930.

BLANC FIXE.—The position of the blanc fixe market is practically unchanged. Demand for both the pulp and the powder is moderately active. The pulp is still quoted at from $42.50 to $45.00 per ton, while the powder is selling at from 3¾ cents to 4½ cents per pound, in barrels, at works.

BLEACHING POWDER.—Conditions in the bleaching powder market are fairly satisfactory. Shipments against contract are moving in seasonal volume. Prices are generally holding to schedule. Bleaching powder is quoted at from $2.00 to $2.35 per 100 pounds, in drums, at works.

CASEIN.—Although demand for casein has improved, prices are easier. Domestic standard ground is quoted at 10½ cents and finely ground at 13 cents per pound. Argentine standard ground is now selling at 12½ cents and finely ground at 13 cents per pound, all in bags, car lot quantities.

CAUSTIC SODA.—Consumption of caustic soda is well maintained. Prices are holding to formerly quoted levels. Solid caustic soda is quoted at from $2.90 to $2.95, while the flake and the ground are selling at from $3.30 to $3.35 per 100 pounds, in large drums, at works.

CHINA CLAY.—Steadiness prevails in the china clay market. The contract movement is well up to average. Prices remain unchanged. Imported china clay is quoted at from $15 to $25 per ton, ship side, while domestic paper making clay is selling at from $8 to $13 per ton, at mine.

CHLORINE.—Demand for chlorine from the paper mills is fairly persistent. Contract shipments are going forward at a steady pace. Prices remain unchanged. Chlorine is quoted at from $2.40 to $2.45 per 100 pounds, in tanks, or multi-unit cars, in ton lots, or over, at works.

ROSIN.—Some slight improvement was noticed in the rosin market. Prices are steadier. The grades of gum rosin used in the paper mills are now quoted at from $5.45 to $5.50 per 280 pounds, in barrels, at yard. Wood rosin is offered at $4.66 per 280 pounds, in car lots, at works.

SALT CAKE.—Trading in the salt cake market was fairly active during the past week. Supplies are moving into consumption in good volume. Prices remain unchanged. Salt cake is quoted at from $22 to $25 per ton, while chrome salt cake is selling at from $20 to $21 per ton, in bulk, at works.

SODA ASH.—The soda ash market is exhibiting a strong undertone. Shipments against contract are moving at a normal pace for the time of year. Prices are holding to schedule. Contract quotations on soda ash, in car lots, at works, are as follows: in bags, $1.32½; and in barrels, $1.55 per 100 pounds.

STARCH.—Offerings of starch are sufficient to take care of current requirements. The contract movement is fairly heavy. Prices are holding to previously quoted levels. Special paper making starch is quoted at $3.62 per 100 pounds, in bags; and at $3.89, in barrels, at works.

SULPHATE OF ALUMINA.—Paper mill demand for sulphate of alumina is satisfactory. Competition for desirable orders, however, is very keen and there are reports of shading. Commercial grades are quoted at from $1.40 to $1.55, and iron free at from $1.90 to $2.05 per 100 pounds, in barrels, at works.

SULPHUR.—Producers of sulphur are maintaining prices at schedule. Sulphur is quoted at $18 per ton, at mine, on orders of 1,000 tons, or over, on yearly contracts, and at $20 per ton for any smaller quantity over that period. On spot and nearby car loads, the quotation is $21 per ton.

TALC.—Most of the business transacted in the talc market was along routine lines. The contract movement is seasonal. Prices remain unchanged. Domestic talc is quoted at from $16 to $18 per ton, in bulk, while imported talc is still selling at from $18 to $20 per ton, in bags, ship side.

Market Quotations

Paper

(F. o. b. Mill)

Ledgers	11.00	@	38.00
Bonds	9.00	@	53.25
Writings—			
Extra Superfine	14.00	@	32.00
Superfine	14.00	@	32.00
Tub sized	10.00	@	15.00
Engine sized	8.00	@	11.00
Book, Cased—			
S. & S. C.	6.00	@	7.50
M. F.	5.75	@	7.00
Coated and Enamel	7.50	@	12.00
Lithograph	7.50	@	12.00
Tissues—Per Ream—			
White No. 1	.75	@	1.00
Anti-Tarnish	1.35	@	1.90
Colored	1.00	@	2.00
White No. 2	.75	@	.80
Kraft	1.00	@	1.10
Manila	.75	@	.80
Kraft—			
No. 1 Domestic	5.75	@	6.25
No. 2 Domestic	3.75	@	5.00
Southern	3.50	@	4.50
Imported	6.50	@	7.00
Manila—			
No. 1 Jute	9.00	@	9.25
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.75	@	5.25
No. 2 Wood	4.00	@	4.50
Butchers	3.75	@	4.25
Fibre Papers—			
No. 1 Fibre	5.00	@	5.50
No. 2 Fibre	4.75	@	5.25
Common Bogus	2.75	@	3.00
Screenings	3.00	@	3.25
Card Middles	4.00	@	5.00
Glassine—			
Bleached, basis 25 lbs.	13.00	@	16.00
Bleached, basis 20 lbs.	15.00	@	16.00

(Delivered New York)

News, per ton—			
Rolls, contract	62.00	@	—
Rolls, spot	62.00	@	—
Sheets	67.00	@	—
Side Runs	47.00	@	52.00
Boards—per ton—			
News	30.00	@	—
Straw	40.00	@	—
Chip	27.50	@	—
Binders' Boards	65.00	@	70.00
85 Test Jute Liner	37.50	@	40.00
Sgl. Mla. Lt. Chip	42.50	@	45.00

(F. o. b. Mill)

Wood Pulp Boards	75.00	@	80.00

Mechanical Pulp

(On Dock)

No. 1 Imported—			
Moist	28.00	@	30.00
Dry	30.00	@	32.00

(F. o. b. Mill)

No. 1 Domestic	26.00	@	30.00

Chemical Pulp

(On Dock, Atlantic Ports)

Sulphite (Imported)—			
Bleached	3.00	@	4.25
Easy Bleaching	2.60	@	2.80
No. 1 strong unbleached	2.10	@	2.65
Mitscherlich unbleached	2.25	@	2.85
No. 2 strong unbleached	2.10	@	2.35
No. 1 Kraft	1.65	@	2.15
No. 2 Kraft	1.55	@	1.65
Sulphate—			
Bleached	3.40	@	3.85

(F. o. b. Pulp Mill)

Sulphite (Domestic)—			
Bleached	2.65	@	4.75
Easy Bleaching Sulphite	2.55	@	2.75
News Sulphite	2.35	@	2.60
Mitscherlich	2.75	@	3.25
Kraft (Domestic)	2.10	@	3.30
Soda Bleached	2.90	@	3.20

Domestic Rags

New Rags

(Prices to Mill f. o. b N. Y.)

Shirt Cuttings—			
New White, No. 1	8.25	@	8.75
New White, No. 2	7.25	@	7.75
Silesias No. 1	6.50	@	7.00
New Unbleached	9.00	@	9.50
New Blue Prints	5.25	@	5.50
New Soft Blacks	4.50	@	5.00
Blue Overall	6.50	@	6.75
Washables	4.25	@	4.75
Fancy	4.75	@	5.25
Mixed Khaki Cuttings	4.75	@	5.25
Pink Corset Cuttings	7.50	@	8.00
O. D. Khaki Cuttings	5.15	@	5.75
Men's Corduroy	3.75	@	4.25
New Mixed Blacks	3.50	@	3.75

Old Rags

White, No. 1—			
Repacked	5.50	@	6.00
Miscellaneous	4.50	@	5.00
White, No. 2—			
Repacked	3.00	@	3.50
Miscellaneous	2.50	@	2.75
St. Soiled, White	2.00	@	2.15
Thirds and Blues—			
Repacked	2.25	@	2.50
Miscellaneous	1.75	@	2.00
Black Stockings	3.25	@	3.75
Roofing Rags—			
Cloth Strippings	1.25	@	1.30
No. 1	1.25	@	1.30
No. 2	.90	@	1.00
No. 3	.70	@	.80
No. 4	.65	@	.70
No. 5A	.50	@	.60

Foreign Rags

New Rags

New Dark Cuttings	2.30	@	2.50
New Mixed Cuttings	2.25	@	2.75
New Light Silesias	6.25	@	6.50
Light Flannelettes	6.50	@	7.00
Unbleached Cuttings	9.00	@	9.50
New White Cuttings	7.75	@	8.50
New Light Oxfords	6.00	@	6.50
New Light Prints	4.75	@	5.25

Old Rags

No. 1 White Linens	7.25	@	8.00
No. 2 White Linens	5.75	@	6.75
No. 3 White Linens	4.75	@	5.25
No. 4 White Linens	3.00	@	3.50
No. 1 White Cotton	5.50	@	6.25
No. 2 White Cotton	4.50	@	5.00
No. 3 White Cotton	3.00	@	4.00
No. 4 White Cotton	1.75	@	2.10
Extra Light Prints	2.75	@	3.00
Ord. Light Prints	2.15	@	2.40
Med. Light Prints	1.65	@	1.75
Dutch Blue Cottons	2.10	@	2.20
French Blue Linens	2.65	@	2.75
German Blue Linens	2.25	@	2.40
German Blue Cottons	1.85	@	1.90
Checks and Blues	1.85	@	1.90
Lindsay Garments	1.20	@	1.30
Dark Cottons	1.00	@	1.10
Old Shopperies	.95	@	1.00
New Shopperies	.95	@	1.05
French Blues	1.90	@	2.00

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	1.50	@	1.60
Domestic	1.65	@	1.75
Wool Tares, light	1.35	@	1.45
Wool Tares, heavy	1.40	@	1.45
Bright Bagging	1.35	@	1.45
Small Mixed Rope	1.15	@	1.25
Manila Rope—			
Foreign	2.85	@	3.00
Domestic	3.25	@	3.50
New Burlap Cut	2.25	@	2.50
Hessian Jute Threads—			
Foreign	3.50	@	4.00
Domestic	2.50	@	2.75

Old Waste Papers

(F. o. b. New York)

Shavings—			
Hard, white, No. 1	3.00	@	3.25
Hard, white, No. 2	2.40	@	2.55
Soft, white, No. 1	2.80	@	2.90
White envelope cuttings	2.90	@	3.10
Flat Stock—			
Stitchless	1.30	@	1.40
Overissue Mag.	1.30	@	1.40
Solid Flat Book	1.20	@	1.30
Crumpled No. 1	.90	@	1.00
Solid Book Ledger	2.00	@	2.10
Ledger Stock	1.30	@	1.40
New B. B. Chips	.35	@	.45
Manilas—			
New Env. Cut.	2.40	@	2.60
New Cuttings	1.50	@	1.75
Extra No. 1 old	1.25	@	1.35
Print	.60	@	.65
Bogus Wrapper	.60	@	.65
Container	.40	@	.50
Old Kraft Machine—			
Compressed bales	1.45	@	1.55
News—			
No. 1 White News	1.77	@	1.87
Strictly Overissue	.50	@	.55
Strictly Folded	.35	@	.40
No. 1 Mixed Paper	.25	@	.30
Common Paper	.15	@	.20

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Special Grades for Beater and Top Sizing

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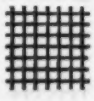

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50 Church St. Hudson Terminal Bdlg.
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Twines
(F. o. b. Mill)

Cotton—			
No. 1	.39	@	.40
No. 2	.37	@	.38
No. 3	.36	@	.37
B. C., 18 basis	.38	@	.40
A. B. Italian, 18 basis	.48	@	.53
Finished Jute—			
Dark 18 basis	.24	@	.25
Light 18 basis	.27	@	.28
Jute Wrappings, 3-6 Ply—			
No. 1	.19	@	.21
No. 2	.18	@	.20
Tube Rope—			
4-ply and larger	.16	@	.17
Fine Tube Yarn—			
5-ply and larger	.21	@	.25
4-ply	.25	@	.29
3-ply	.28	@	.32
Unfinished India—			
Basis	.13	@	.14
Paper Makers Twine Balls	.11	@	.12
Box Twine, 2-3 ply	.15	@	.17
Jute Rope	.17	@	.19
Amer. Hemp, 6	.29	@	.31
Sisal Hay Rope—			
No. 1 Basis	.16	@	.18
No. 2 Basis	.14	@	.16
Sisal Lath Yarn—			
No. 1	.14	@	.16
No. 2	.12	@	.14
Manila Rope	.22	@	.24

CHICAGO

Paper
(F. o. b. Mill)

Rag Bond	.30	@	.53¼
Water Marked Sulphite Bond	.09	@	.12
Sulphite Bond	.06¾	@	.11
Superfine writing	.18	@	.24
No. 1 fine writing	.14	@	.18
No. 2 fine writing	.12	@	.14
No. 3 fine writing	.08½	@	.12
No. 1 M. F. Book	.06½	@	.07¼
No. 2 M. F. Book	.05¼	@	.06¾
No. 1 S.&S.C. Book	.06¾	@	.07¾
No. 2 S.&S.C. Book	.05¾	@	.06½
Coated Book	.07½	@	.12
Coated Label	.07½	@	.10
No. 1 Manila	.04¼	@	.05¾
No. 1 Fibre	.04¾	@	.05¾
No. 2 Manila	.04¼	@	.04¾
Butcher's Manila	.04	@	.04½
No. 1 Kraft	5.00	@	5.50
Southern Kraft	3.75	@	4.00
No. 2 Kraft	3.75	@	4.00
Wood Tag Boards	.04¾	@	.06½
Sulphite Sreenings	.03	@	.03¾
Manila Tissue—			
24x36 Sheet	.07	@	.07¼
White Tissue—			
20x30 Sheet	.07¼	@	.07½
(Delivered Central Territory)			
News, per ton—			
Rolls, contract	62.00	@	—
Sheets	67.00	@	—
Boards, per ton—			
Plain Chip	30.00	@	35.00
Solid News	37.50	@	—
Solid News	32.50	@	37.50
Manila Lined Chip	40.00	@	45.00
Container Lined—			
85 Test	50.00	@	55.00
100 Test	55.00	@	60.00

Old Papers
(F. o. b. Chicago)

Shavings—			
No. 1 Hard White	2.35	@	2.40
White Env. Cut-			
No. 1 Soft Shavings	2.10	@	2.15
No. 1 Mixed	.30	@	.35
No. 2 Mixed	.25	@	.35
Ledger & Writings	.90	@	.95
Solid Books	.90	@	.95
Blanks	1.60	@	1.65
Krafts	1.30	@	1.40
New Kraft Cuts	1.50	@	1.70
Manila Envelope Cuttings	1.65	@	1.70
Ex. No. 1 Manila	1.30	@	1.45
Print Manila	.45	@	.50
Folded News (over-issue	.40	@	.45
Old Newspapers—			
No. 1	.35	@	.40
No. 2	.30	@	.35
Mixed Papers—			
No. 1	.30	@	.35
Roofing Stocks—			
(F. o. b. Chicago, net cash)			
No. 1	30.00	@	—
No. 2	28.00	@	—

PHILADELPHIA

Paper
(F. o. b. Mill)

Bonds	.05	@	.40
Ledgers	.08	@	.40
Writings—			
Superfine	.12½	@	.18
Extra fine	.18	@	.22
Fine	.17	@	.26
Fine, No. 2	.15	@	.25
Fine, No. 3	.09	@	.20
Book, M. F.	.05	@	.07
Book, S. S. & C.	.05	@	.07½
Book, Coated	.09	@	.16
Coated Lithograph	.07	@	.11
Label	.07	@	.11
No. 1 Jute Manila	.07	@	.09
Manila Sul., No. 1	.03½	@	.05½
Manila No. 2	.03	@	.04
No. 1 Kraft	.05¼	@	.06
No. 2 Kraft	.03½	@	.04
Southern Kraft No. 1	—	@	.03¾
Southern Kraft No. 2	—	@	.03½
Common Bogus	.03	@	.04
(Delivered Philadelphia)			
News Print Rolls	62.00	@	—
Straw Board	52.50	@	70.00
News Board	32.50	@	35.00
Chip Board	30.00	@	32.00
Wood Pulp Board	85.00	@	95.00
Binder Boards—			
No. 1, per ton	75.00		
No. 2, per ton	70.00		
Carload lots	68.00	@	70.00
Tarred Felts—			
Regular	55.50	@	57.00
Slaters (per roll)	.84	@	.94
Best Tarred, 1-ply (per roll)	1.95	@	2.10
Best Tarred, 2-ply (per roll)	1.50	@	1.60
Best Tarred, 3-ply	2.00	@	2.25

Domestic Rags (New)
(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1	.09	@	.09½
New White, No. 2	.07	@	.07½
Light Silesias	.07	@	.07½
Silesias, No. 1	.07	@	.09
Black Silesia, soft	.05	@	.05½
New Unbleached	.08½	@	.09
Washable, No. 1	.04½	@	.05
Blue Overall	.07½	@	.08
Cottons—According to grades—			
Washable, No. 2	.03	@	—
New Blue	.03	@	.03½
Fancy	.05	@	.05½
New Black Soft	.05	@	.05¼
New Light Seconds	.02½	@	.03
New Dark Seconds	1.85	@	2.00
Khaki Cuttings—			
No. 1 O. D.	.05½	@	.05¾
No. 2 Mixed	.04½	@	.04¾
Corduroy	.03	@	.03½
New Canvas	.08¼	@	.09
New Black Mixed	.03¾	@	.04½

Bagging
(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	1.50	@	1.60
Domestic	1.75	@	—
Manila Rope	3.50	@	4.00
Sisal Rope	1.50	@	—
Mixed Rope	1.10	@	1.25
Scrap Burlaps—			
No. 1	1.50	@	1.60
No. 2	1.10	@	1.20
Wool Tares, heavy	3.00	@	—
Mixed Strings	1.15	@	1.25
No. 1, New Light Burlap	2.50	@	2.75
New Burlap Cuttings	2.00	@	2.25

Old Papers
(F. o. b. Phila.)

Shavings—			
No. 1 Hard White	2.65	@	2.75
No. 2 Hard White	2.30	@	2.50
No. 1 Soft White	2.25	@	2.50
No. 2 Soft White	1.40	@	1.60
No. 1 Mixed	.90	@	1.00
No. 2 Mixed	.60	@	.70
Solid Ledger Stock	1.55	@	1.65
Writing Paper	1.05	@	1.25
No. 1 Books, heavy	1.00	@	1.15
No. 2 Books, light	.90	@	.95
No. 1 New Manila	2.15	@	2.30
No. 1 Old Manila	1.50	@	1.60
Print Manila	.50	@	.60
Container Manila	.45	@	.50
Old Kraft	1.35	@	1.40
Common Paper	.25	@	.35
No. 1 Mixed Paper	.25	@	.30
Straw Board, Chip	.35	@	.40
Binders Board, Chip	.35	@	.45
Corrugated Board	.50	@	.60
Overissue News	.45	@	.50
Old Newspaper	.25	@	.30

Domestic Rags (Old)

White No. 1—			
Repacked	4.25	@	4.50
Miscellaneous	3.50	@	3.75
M. G.	6.00	@	—
Thirds and Blues—			
Repacked	2.00	@	2.25
Miscellaneous	1.60	@	1.80
Black Stockings (Export)	3.90	@	4.25
Roofing Stock—			
Foreign No. 1	1.25	@	1.30
Repacked	.80	@	.90
No. 2	.70	@	.75
No. 3 (Roofing)	.30	@	.40
No. 4	.30	@	.40
No. 5A	.70	@	.75
B	.40	@	.60
C	.25	@	.36

BOSTON

Paper
(F. o. b. Mill)

Ledgers—			
Sulphite	.07½	@	.12½
Rag content	.15	@	.30
All rag	.38	@	.52½
Bonds—			
Sulphite	.06½	@	.11½
Rag content	.15	@	.30
All rag	.36½	@	.65
Writings	.06½	@	.20
Superfines	.11	@	.31
Book, Super	.06	@	.09
Book, M. F.	.05½	@	.08½
Book, Coated	.08½	@	.18
Coated Litho	.09	@	.12
Label	.09½	@	.15
Jute Manila No. 1	.11	@	.13
Manila, Sul. No. 1	.04¼	@	.06½
Manila, Sul. No. 2	.03¾	@	.04½
No. 1 Kraft	.04¾	@	.06
No. 2 Kraft	.03¾	@	.05
(Less car-freight to Boston)			
Southern Kraft	.03¾	@	.04¼
(F. o. b. destination in carload lots, f. o. b. mill in less than carload lots.)			
Common Bogus	.02	@	.02¾
Delivered New England points			
News Print Rolls	61.50	@	—
Straw Boards, rolls	.009		52.50
Straw Board in Sheets, basis 35s to 70s	54.50	@	55.00
Filled News Board	32.50	@	—
Chip Board	30.00	@	—
Chip Board (Special)	32.50	@	—
Single Manila Lined Chip	45.00	@	—
Single White, Patent Coated Newsboard Bender	65.00	@	80.00
Wood Pulp Board	75.00	@	80.00
Binder Boards	70.00	@	75.00
(F. o. b. Mill)			
Tarred Felts—			
Regular, carload lots	65.00	@	—

Old Papers
(F. o. b. Boston)

Shavings—			
No. 1 Hard White	3.25	@	3.75
No. 2 Hard White	2.60	@	2.90
No. 1 Soft White	2.40	@	2.50
No. 1 Mixed	1.10	@	1.15
No. 2 Mixed	.85	@	.90
Solid Ledger Stock	—	@	2.25
No. 1 Books, Heavy	1.00	@	—
No. 1 Books, Light	.85	@	—
Crumpled Stitchless Book Stock	—	@	.70
Manila Env. Cuttings	2.00	@	2.25
No. 1 Old Manila	—	@	1.00
White Blank News	1.50	@	1.60
Old Kraft	1.30	@	1.35
Print Manila	.75	@	.80
No. 1 Mixed Paper	.20	@	.25
Overissue News	.35	@	.40
Old Newspapers	.37½	@	.40
Box Board, Chip	.50	@	.55
Corrugated Boxes	.40	@	—

Bagging
(F. o. b. Boston)

Gunny No. 1—			
Foreign	—	@	1.65
Domestic	1.60	@	—
Manila Rope—			
Foreign	2.75	@	3.00
Domestic	—	@	3.50
Transmission Rope	2.35	@	2.50
Mixed Strings	.75	@	1.00
Jute Wool Strings	1.00	@	—
Jute Carpet Threads	1.00	@	1.10
Scrap Burlaps	1.30	@	1.35
Scrap Sisal	—	@	1.50
Scrap Sisal for shredding	—	@	1.75
Wool Tares, heavy	—	@	1.40
New Burlap Cutting	1.75	@	2.00
Australian Wool Pouches	2.50	@	2.75
Heavy Baling Bagging	2.00	@	2.10

Domestic Rags (New)
(F. o. b. Boston)

Shirt Cuttings—			
New White No. 1	.07½	@	.08
New White No. 2	—	@	.06
Silesias No. 1	.06	@	.06¼
New Unbleached	—	@	.09¼
Fancy	.04	@	.04½
Washable	.04	@	.04½
Cottons—According to grades			
Blue Overalls	.06¼	@	.06¾
New Black, soft	.04	@	.04¼
Khaki Cuttings	.04	@	.04¼
O. D. Khaki	.04½	@	.05
Corduroy	.03	@	.03½
New Canvas	.08	@	.08¼

Domestic Rags (Old)
(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	4.75	@	5.25
Miscellaneous	5.00	@	—
White No. 2—			
Repacked	.04½	@	.05
Miscellaneous	.03½	@	.04
Twos and Blues	2.75	@	3.00
Thirds and Blues—			
Repacked	2.25	@	2.50
Miscellaneous	1.75	@	1.90
Black Stockings	3.65	@	4.00
Roofing Stock—			
No. 1	1.25	@	1.50
No. 2	.90	@	1.00
No. 3	.85	@	.90
No. 4	.75	@	.85

Foreign Rags
(F. o. b. Boston)

Dark Cottons	.90	@	.95
New No. 1 Shirt Cuttings	8.00	@	8.50
Dutch Blues	—	@	2.00
Lace Curtains	4.00	@	4.25
New Checks & Blues	4.25	@	4.60
Old Fustians	1.65	@	1.75
Old Linsey Garments	1.50	@	—

TORONTO

Paper
(F. o. b. Mill)

Bond—			
No. 1 Sulphite	.12½	@	—
No. 2 Sulphite	.10¾	@	—
No. 1 Colored	.13½	@	—
No. 2 Colored	.11¼	@	—
Ledgers (sulphite)	—	@	—
Ledgers, No. 1	.36	@	—
Ledgers, No. 2	.27	@	—
Writing	.09½	@	.10
Book—			
No. 1 M. F. (carloads)	7.50	@	—
No. 2 M. F. (carloads)	7.25	@	—
No. 3 M. F. (carloads)	7.00	@	—
No. 1 S. C. (carloads)	8.00	@	—
No. 2 S. C. (carloads)	7.75	@	—
No. 3 S. C. (carloads)	7.50	@	—
No. 1 Coated and Litho	13.25	@	—
No. 2 Coated and Litho	12.25	@	—
No. 3 Coated and Litho	10.00	@	11.50
Coated tinted	14.50	@	—
Wrapping—			
Rag Brown	4.95	@	—
White Wrap	5.25	@	—
"B" Manila	5.00	@	—
No. 1 Manila	5.40	@	—
Fiber	5.40	@	—
Kraft, M. F.	5.90	@	—
White, No. 2	2.00	@	2.25
News, per ton—			
Rolls (contract)	61.50	@	62.00
Sheets	67.00	@	—

Pulp
(F. o. b. Mill)

Ground Wood	30.00	@	32.00
Sulphite easy bleaching	60.00	@	—
Sulphite news grade	60.00	@	—
Sulphite, bleached	72.50	@	75.00
Sulphate	60.00	@	—

Old Waste Paper
(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut	3.00	@	—
Soft White Book Shavings	2.85	@	—
White Blk. News	1.60	@	—
Book and Ledger—			
Flat Magazine and Book Stock (old)	1.40	@	—
Light and Crumpled Book Stock	1.25	@	—
Ledgers and Writ-			
Solid Ledgers	1.50	@	—
Manilas—			
New Manila Cut	1.50	@	—
Printed Manilas	1.00	@	—
Kraft	2.25	@	—
News and Scrap—			
Strictly Overissue	.85	@	—
Strictly Folded	.85	@	—
No. 1 Mixed Paper	.65	@	—

Domestic Rags
(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.09½	@	.10
Fancy Shirt Cuttings	.08	@	.08

Advertising matter paged consecutively with text, has been removed here to lessen the bulk of this volume.